professor Course: **NSieben_136H**

WeBWorK assignment number 01_sect_11 is due : 08/31/2007 at 02:00am MST.

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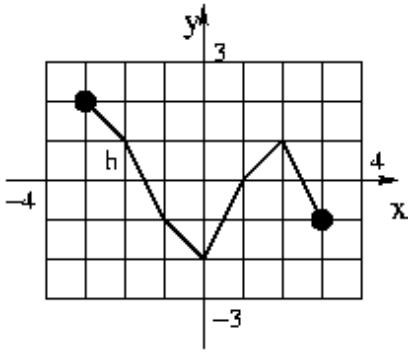
1. **(1 pt)pl/setAlgebra16FunctionGraphs/sw4_2_1.pg**

The graph of the function h is shown.



The domain of h is _____.
The range of h is _____.
(Write the domain and range in interval notation.)

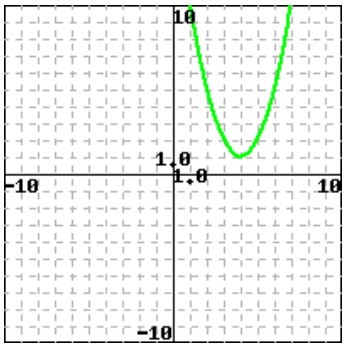
Enter the corresponding function value in each answer space below:

___1. $h(2)$
___2. $h(0)$
___3. $h(1)$
___4. $h(-1)$

---

2. **(1 pt)pl/setAlgebra16FunctionGraphs/lh2-3_30a.pg**

Consider the function whose graph is sketched:



Find the intervals over which the function is increasing or decreasing. If the answer includes more than one interval write the intervals separated by the ”union” symbol, U. You may use ”infinity” for ∞ and ”-infinity” for $-\infty$. For example, you may write (-infinity, 5] for the interval $(-\infty, 5]$ and (-infinity, 5]U(7,9) for $(-\infty, 5] \cup (7, 9)$.

The interval over which the function is increasing: _____

The interval over which the function is decreasing: _____

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3. **(1 pt)pl/setAlgebra15Functions/s0_1_11.pg**

The domain of the function $f(x) = \sqrt{-4x-32}$ consists of one or more of the following intervals: $(-\infty, A]$ and $[A, \infty)$.

Find A _____

For each interval, answer YES or NO to whether the interval is included in the solution.

$(-\infty, A]$ _____
$[A, \infty)$ _____

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4. **(1 pt)pl/setAlgebra15Functions/p7.pg**

The domain of the function

$$\frac{x+17}{x^2-225}$$

is _____

Write the answer in interval notation.

Note: If the answer includes more than one interval write the intervals separated by the union symbol, U. If needed enter $-\infty$ as - *infinity* and ∞ as *infinity* .

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5. **(1 pt)pl/setAlgebra15Functions/p1.pg**

The domain of the function

$$f(x) = \frac{1}{\sqrt{8x+14}}$$

is _____

Write the answer in interval notation.

Note: If the answer includes more than one interval write the intervals separated by the union symbol, U. If needed enter $-\infty$ as - *infinity* and ∞ as *infinity* .

---

6. **(1 pt)pl/setAlgebra15Functions/s0_1_18a.pg**

The domain of the function $f(x) = \sqrt{35+2x-x^2}$ is the closed interval $[A, B]$
where $A =$ _____
and $B =$ _____

---

7. **(1 pt)pl/setAlgebra15Functions/srw2_1_23.pg**

Given the function

$$f(x) = \begin{cases} x^2+2x, & \text{if} \quad x \leq -1 \\ x+3, & \text{if} \quad x > -1 \end{cases}$$

Calculate the following values:
$f(-6) =$ _____
$f(-1) =$ _____
$f(2) =$ _____

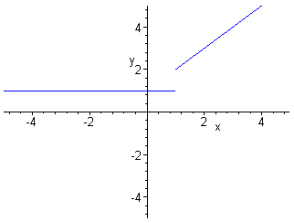
---

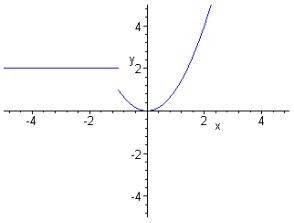
8. **(1 pt)pl/setAlgebra15Functions/srw2_1_33.pg**

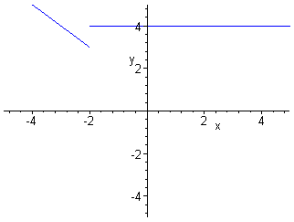
Given the function $f(x) = -2+2x^2$, calculate the following values:
$f(a) =$ _____
$f(a+h) =$ _____
$\dfrac{f(a+h)-f(a)}{h} =$ _____

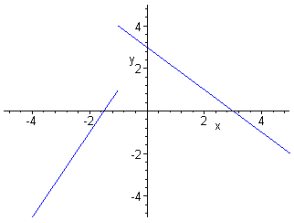
9. **(1 pt)pl/setAlgebra16FunctionGraphs/c4s2p59_72/c4s2p59_72.pg**
Match the functons with their graphs. Enter the letter of the graph below which corresponds to the function.

___1. Piecewise function: $f(x) = 1 - x$ if $x < -2$, and $f(x) = 4$ if $x \geq -2$
___2. Piecewise function: $f(x) = 1$ if $x \leq 1$, and $f(x) = x + 1$ if $x > 1$
___3. Piecewise function: $f(x) = 2x + 3$ if $x < -1$, and $f(x) = 3 - x$ if $x \geq -1$
___4. Piecewise function: $f(x) = 2$ if $x \leq -1$, and $f(x) = x^2$ if $x > -1$

A.


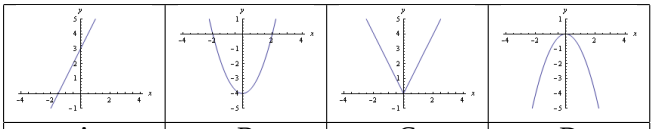
B.


C.


D.


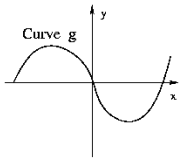
10. **(1 pt)pl/setAlgebra16FunctionGraphs/c4s2p19_40/c4s2p19_40.pg**
Match the functions with their graphs. Enter the letter of the graph below which corresponds to the function.

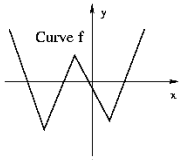
___1. $|2x|$
___2. $-x^2$
___3. $2x + 3$
___4. $x^2 - 4$

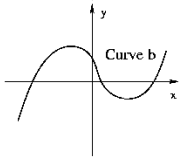


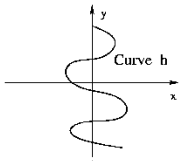
A	B	C	D

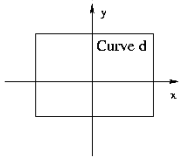
11. **(1 pt)pl/setAlgebra16FunctionGraphs/c2s2p5_7/c2s2p5_7.pg**
Enter "Yes" or "No" in each answer space below to indicate whether the corresponding curve defines y as a function of x.
NOTE: "Y" or "N" will be marked wrong. Enter "Yes" or "No". (WeBWorK is case insensitive, so "yes" or "Yes" are both OK.)

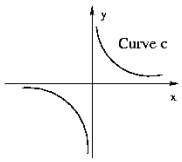
___1.


___2.


___3.


___4.


___5.


___6.


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1. **(1 pt)pl/setHagoodPrecalc/linearfunc1.pg**

The linear function f with values $f(-4) = 10$ and $f(6) = -3$ is $f(x) =$ _____

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2. **(1 pt)pl/setHagoodPrecalc/linearfunc2.pg**

A chair manufacturer finds that it costs 12687.5 dollars to manufacture 265 chairs and 23737.5 dollars to manufacture 525 chairs in one day, including all costs associated with the factory and the manufacturing process. Express the cost $C(x)$ to manufacture x chairs assuming that it is a linear function: $C(x) =$ _____

What are the fixed daily costs associated with the manufacuring process, even if no chairs are made? _____

How much does it cost to make each chair, aside from the fixed costs? _____

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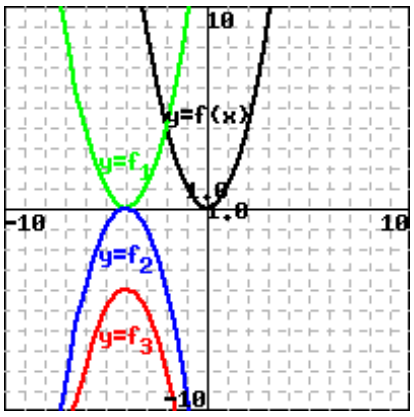
3. **(1 pt)pl/setAlgebra19FunTransforms/lh2-4_23.pg**



The graph of $f(x) = x^2$ is sketched in black and it had undergone a series of translations to graphs of functions f_1 sketched in green, f_2 sketched in blue, and f_3 sketched in red. $f \to f_1 \to f_2 \to f_3$. Use the translation rule and $f(x) = x^2$ to identify the function $f_1(x)$;

$f_1(x) =$_____

Use the translation rule and $f_1(x)$ to identify the function $f_2(x)$;

$f_2(x) =$_____

Use the translation rule and $f_2(x)$ to identify the function $f_3(x)$;

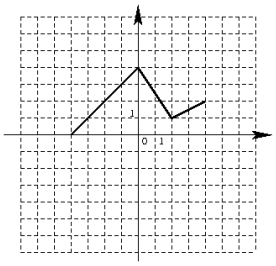
$f_3(x) =$_____

---

4. **(1 pt)pl/setAlgebra19FunTransforms/SRW2_5_11/srw2_5_11.pg**

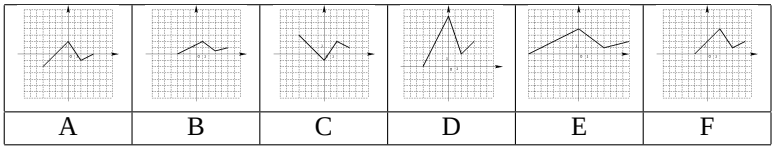
Click on image for a larger view

For the function $f(x)$ given in the graph



Match the following functons with their graphs. Enter the letter of the graph below which corresponds to the function.

___1. $y = f(x-2)$
___2. $y = f(x)-2$
___3. $y = -f(x)+3$
___4. $y = \frac{1}{2}f(x-1)$
___5. $y = 2f(x)$
___6. $y = f(\frac{1}{2}x)$



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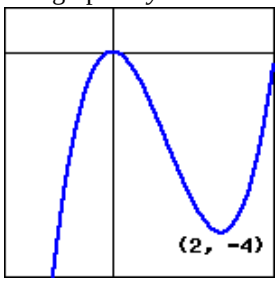
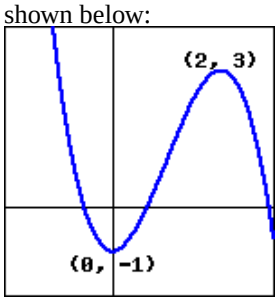
5. **(1 pt)pl/setAlgebra19FunTransforms/lance1.pg**

The graph of $y = x^3 - 3x^2$ is shown below:



Find a formula for the transformed function whose graph is shown below:



$y =$ _____

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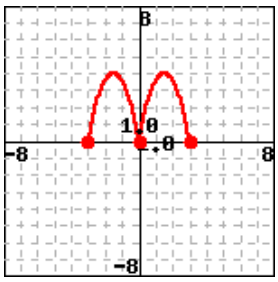
6. **(1 pt)pl/setAlgebra19FunTransforms/scaling.pg**

Let g be the function below.

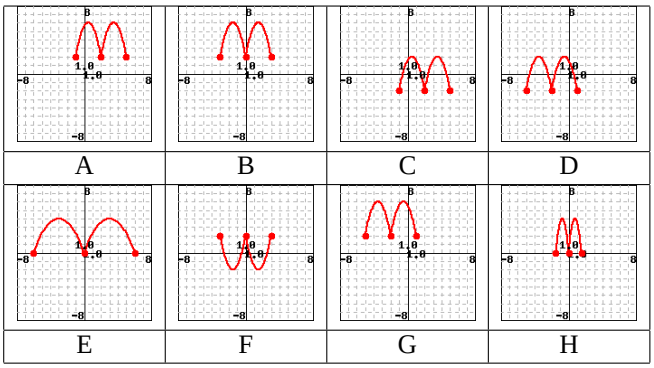


The domain of $g(x)$ is of the form $[a,b]$, where a is ___ and b is ___.

The range of $g(x)$ is of the form $[c,d]$, where c is ___ and d is ___.

Enter the letter of the graph which corresponds to each new function defined below:

1. $g(x-2)+2$ is ___.
2. $g(2x)$ is ___.
3. $2+g(-x)$ is ___.
4. $g(x+2)-2$ is ___.



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7. **(1 pt)pl/setAlgebra17FunComposition/beth1.pg**

Given that $f(x)=x^2-2x$ and $g(x)=x+5$, find

(a) $(f+g)(x)=$ _____

(b) $(f-g)(x)=$ _____

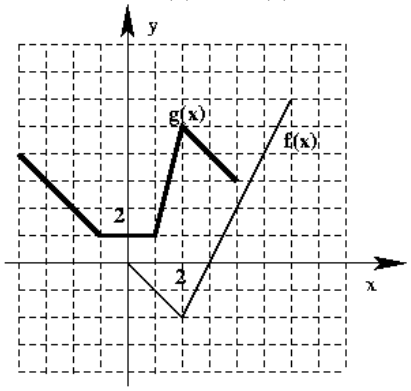
(c) $(fg)(x)=$ _____

(d) $(f/g)(x)=$ _____

---

8. **(1 pt)pl/setAlgebra17FunComposition/beth2algfun.pg**

For the function $f(x)$ and $g(x)$ given in the graph



find the corresponding function values. If there is no function value, type DNE in the answer blank.

$(f+g)(1)=$ _____

$(f-g)(3)=$ _____

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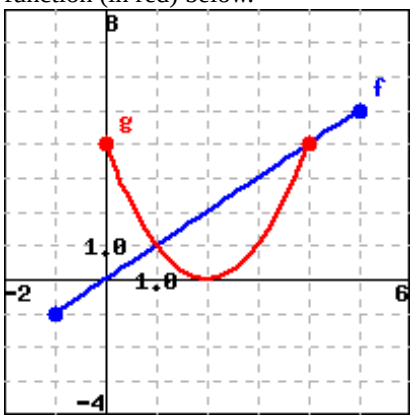
9. **(1 pt)pl/setAlgebra17FunComposition/ur_fn_2_1.pg**

Let f be the linear function (in blue) and let g be the parabolic function (in red) below.



Note: If the answer does not exist, enter 'DNE':

1. $(f\circ g)(2)=$ ___
2. $(g\circ f)(2)=$ ___
3. $(f\circ f)(2)=$ ___
4. $(g\circ g)(2)=$ ___
5. $(f+g)(4)=$ ___
6. $(f/g)(2)=$ ___

---

10. **(1 pt)pl/setAlgebra17FunComposition/sw4_7_21.pg**

Given that $f(x)=3x+2$ and $g(x)=3-x^2$, calculate

(a) $f\circ g(x)=$ _____

(b) $g\circ f(x)=$ _____

---

11. **(1 pt)pl/setAlgebra17FunComposition/sw4_7_45.pg**

Express the function $h(x)=(x+7)^2$ in the form $f\circ g$. If $f(x)=x^2$, find the function $g(x)$.

Your answer is $g(x)=$ _____,

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12. **(1 pt)pl/setAlgebra17FunComposition/ns1_2_37.pg**

Let $f(x)=\dfrac{1}{3x}$, $g(x)=4x^3$, and $h(x)=5x^2+10$.

Then $f\circ g\circ h(6)=$_____

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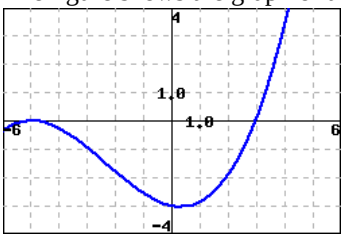
13. **(1 pt)nauLibrary/setFunctionBasicGraphs/formulaFromPolyGraph.pg**

FORMULA FROM CUBIC GRAPH

The figure shows the graph of a cubic polynomial.



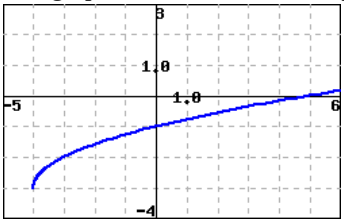
The function graphed is $f(x)=$ _____.

Hint: You may write the function as $f(x)=a(x-b)(x-c)(x-d)$ where b, c, and d, are integers and a is a fraction.

14. **(1 pt)nauLibrary/setFunctionBasicGraphs/formulaFromSqrtGraph.pg**

FORMULA FROM SQRT GRAPH

The graph shown is of the form $y = f(x) = a\sqrt{bx+c}+d$.



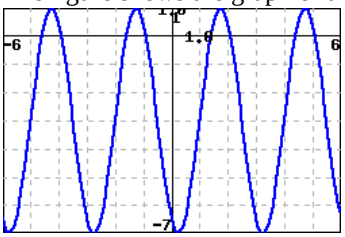
The function graphed is $f(x) =$ _____.

Hint: The first parameter is $a = \pm 1$, and the other parameters are integers.

15. **(1 pt)nauLibrary/setFunctionBasicGraphs/formulaFromTrigGraph.pg**

FORMULA FROM TRIG GRAPH

The figure shows the graph of a trigonometric function.



The function graphed is $f(x) =$ _____.

Hint: The function may be written as $f(x) = a\sin\left(\frac{2\pi}{P}(x-b)\right)+c$ or $f(x) = a\cos\left(\frac{2\pi}{P}(x-b)\right)+c$ (or both), where a, b, c, and P, are integers.

professor Course: **NSieben_136H**

WeBWorK assignment number 03_sect_15 is due : 09/10/2007 at 02:00am MST.

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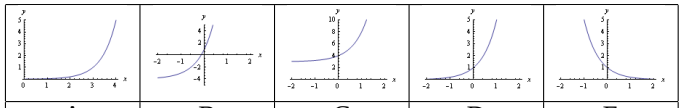
1. **(1 pt)pl/setAlgebra28ExpFunctions/c4s1p13_18/c4s1p13_18a.pg**

Match the functions with their graphs. Enter the letter of the graph below which corresponds to the function.

___1. $f(x) = 5^{x-3}$
___2. $f(x) = 5^{-x}$
___3. $f(x) = 5^{x}$
___4. $f(x) = 5^{x+1} - 4$
___5. $f(x) = 5^{x} + 3$



A	B	C	D	E

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2. **(1 pt)pl/setAlgebra28ExpFunctions/ur_log_1_3.pg**

Starting with the graph of $f(x) = 7^x$, write the equation of the graph that results from

(a) shifting $f(x)$ 8 units upward. $y =$ _____

(b) shifting $f(x)$ 4 units to the right. $y =$ _____

(c) reflecting $f(x)$ about the x-axis and the y-axis. $y =$ _____

(d) reflecting $f(x)$ about the line $x = -2$. $y =$ _____

---

3. **(1 pt)pl/setAlgebra28ExpFunctions/srw4_1_33.pg**

Find the exponential function $f(x) = Ca^x$ whose graph goes through the points $(0,4)$ and $(3,32)$.

$a =$ _____,

$C =$ _____.

---

4. **(1 pt)pl/setAlgebra31LogExpApplications/ur_le_2_12a.pg**

A certain bacteria population is known to triple every 150 minutes. Suppose that there are initially 200 bacteria.

What is the size of the population after t hours? _____

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5. **(1 pt)nauLibrary/setExponentialModeling/twoTimes.pg**

The count in a bateria culture is 800 after 13 minutes and 2000 after 32 minutes. Assuming the bacteria count grows exponentially, we can conclude that the population grows by a factor of _____ every 19 minutes, and the population of bacteria after t minutes is $P =$ _____.

Hint: You may write the population in the form $P = P_0\, a^{(t-t_0)/h}$.

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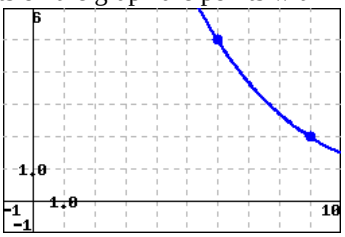
6. **(1 pt)nauLibrary/setFunctionBasicGraphs/formulaFromExpGraph.pg**

FORMULA FROM EXPONENTIAL GRAPH

The figure shows the graph of an exponential function. The dots on the graph are points with integer coordinates.



The function graphed is $f(t) =$ _____.

Hint: The function may be written as $f(t) = y_0 a^{(t-t_0)/h}$, where y_0, t_0, and h, are integers. Note that $f(t+h) = af(t)$ for all t.

---

7. **(1 pt)pl/setAlgebra31LogExpApplications/srw4_2_2.pg**

The doubling period of a baterial population is 20 minutes. At time $t = 110$ minutes, the baterial population was 60000. What was the initial population at time $t = 0$? _____

Find the size of the baterial population after 4 hours. _____

---

8. **(1 pt)pl/setAlgebra31LogExpApplications/decay2.pg**

The half-life of Palladium-100 is 4 days. After 12 days a sample of Palladium-100 has been reduced to a mass of 3 mg. What was the initial mass (in mg) of the sample? _____

What is the mass 6 weeks after the start? _____

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9. **(1 pt)nauLibrary/setExpLog/expWins.pg**

Compare the functions $f(x) = x^{12}$ and $g(x) = e^x$ by graphing both f and g on your calculator, using several viewing rectangles. When does the graph of g finally surpass the graph of f? The graphs intersect for the last time at $x \approx$ _____ . (Round your answer to four significant figures.)

Hints: To get this much accuracy you can use the intersect feature of your calculator, or make a very narrow x window. You **must** round your answer or it will be marked wrong.

professor Course: **NSieben_136H**

WeBWorK assignment number 04_sect_16 is due : 09/13/2007 at 02:00am MST.

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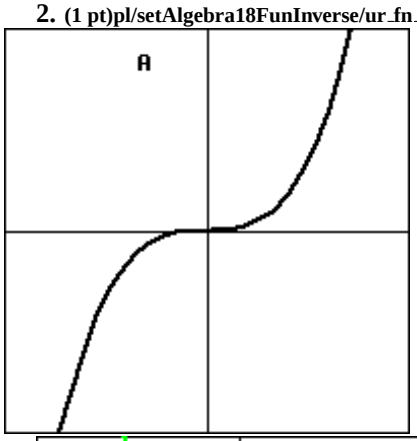
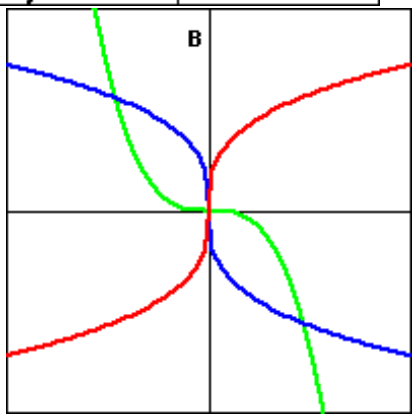
1. **(1 pt)pl/setAlgebra18FunInverse/srw2_10_17.pg**

If f is one-to-one and $f(-5) = 13$, then
$f^{-1}(13) =$ _____
and $(f(-5))^{-1} =$ _____.
If g is one-to-one and $g(1) = 11$, then
$g^{-1}(11) =$ _____
and $(g(1))^{-1} =$ _____.
If h is one-to-one and $h(-1) = 8$, then
$h^{-1}(8) =$ _____
and $(h(-1))^{-1} =$ _____.

---

2. **(1 pt)pl/setAlgebra18FunInverse/ur_fn_4_4.temp.pg**





A function $f(x)$ is graphed in plane A. It is a 1-to-1 function, so it must have an inverse.
Enter the color (”red”, ”green”, or ”blue”) of its inverse function which is graphed in plane B. Use what you know about the graphs of inverse functions rather than algebraic calculations based on what you might guess the function to be.
Color of f^{-1} graph = _____
Important!! You only have 2 attempts to get this problem right!

---

3. **(6 pts)pl/setAlgebra18FunInverse/srw2_10_7-12a.pg**

Enter a Y (for Yes) or an N (for No) in each answer space below to indicate whether the corresponding function is one-to-one or not.
You must get all of the answers correct to receive credit.

___1. $k(x) = (x-7)^2, \quad 6 \le x \le 8$
___2. $k(x) = \cos x, \quad 0 \le x \le \pi$
___3. $g(t) = 3t^2 + 7$
___4. $h(t) = 3t^2 + 7, \quad t \le 0$
___5. $k(t) = 3\sqrt{t} + 4$
___6. $h(x) = |x| + 6$

---

4. **(1 pt)pl/setAlgebra18FunInverse/ur_inv_2.pg**

Find the inverse for each of the following functions.
$f(x) = 7x + 14$
$f^{-1}(x) =$ _____
$g(x) = 11x^3 - 12$
$g^{-1}(x) =$ _____
$h(x) = \dfrac{7}{x+12}$
$h^{-1}(x) =$ _____
$j(x) = \sqrt[3]{x+11}$
$j^{-1}(x) =$ _____

---

5. **(1 pt)nauLibrary/setInverseFun/numericalInverse.pg**

Find the approximate value of $f^{-1}(3)$ for the function $f(x) = 0.9x + 0.9x^3 + 0.2x^5$.
$f^{-1}(3) =$ _____ .
Hint: Do not try to find $f^{-1}(x)$ for arbitrary x; it's impossible. Use the intersect feature on your calculator or some other technology. Your answer needs to be correct to within one tenth of a percent.

---

6. **(1 pt)pl/setAlgebra29LogFunctions/sw6_3_17.pg**

Evaluate the expression, reduce to simplest form.
(a) $\log_3\left(\frac{1}{9}\right)$
Your answer is _____
(b) $\log \sqrt[4]{10}$
Your answer is _____
(c) $\log 0.001$
Your answer is _____

---

7. **(1 pt)pl/setAlgebra29LogFunctions/sw6_3_19.pg**

Evaluate the expression, reduce to simplest form.
(a) $2^{\log_2 5}$
Your answer is _____
(b) $10^{\log 5}$
Your answer is _____
(c) $e^{\ln 9}$
Your answer is _____

---

8. **(1 pt)pl/setAlgebra29LogFunctions/srw4_2_59.pg**

The domain of the function $g(x) = \log_a(x^2 - 36)$ is
$(-\infty,$ _____ $) \cup ($ _____, $\infty)$.

9. **(1 pt)pl/setHagoodPrecalc/expeqn3_a.pg**
Solve for x:

$$x = 2^{7\log_2 2 - \log_2 11}$$

$x =$ _____
Note: Your answer must have no logarithms and no exponential "^" symbols.

10. **(1 pt)pl/setAlgebra31LogExpApplications/problem9.pg**
If $\log\ p = x$ and $\log\ q = y$, evaluate the following in terms of x and y:
(a) $\log\ (p^8 q^7) =$ _____
(b) $\log\ \sqrt{p^{-4}q^{-1}} =$ _____
(c) $\log\ \dfrac{p^{-8}}{q^9} =$ _____
(d) $\dfrac{\log\ p^{-9}}{\log\ q^{-6}} =$ _____
(e) $(\log\ p^9)^{-1} =$ _____

11. **(1 pt)pl/setAlgebra30LogExpEqns/sw6_5_15.pg**
Find the solution of the exponential equation

$$e^{2x+1} = 4$$

in terms of logarithms, or correct to four decimal places.
$x =$ _____

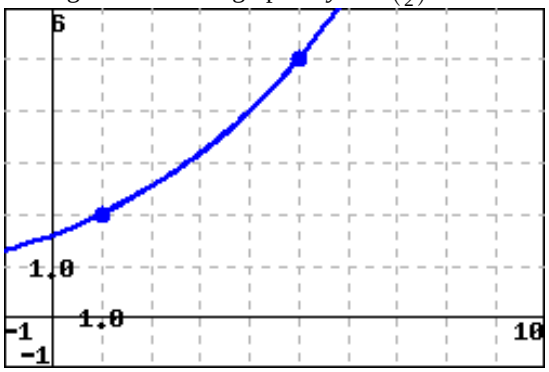
12. **(1 pt)nauLibrary/setExpLog/WPExp2.pg**
In a certain country, the rate of deforestation is about 4.19% per year. Assume that the amount of forest remaining is given by the function

$F = F_0 e^{-0.0419t}$

where F_0 is the present acreage of forest land and t is the time in years from the present. In how many years will there be only 70% of the present acreage remaining?
Round your answer to three decimal places.
_____ years from now

13. **(1 pt)pl/setAlgebra31LogExpApplications/radioactive_dye_a.pg**
You go to the doctor and he gives you 14 milligrams of radioactive dye. After 24 minutes, 6.5 milligrams of dye remain in your system. To leave the doctor's office, you must pass through a radiation detector without sounding the alarm. If the detector will sound the alarm if more than 2 milligrams of the dye are in your system, how long will your visit to the doctor take, assuming you were given the dye as soon as you arrived? Give your answer to within 0.1 per cent (three or four significant figures).
You will spend _____ minutes at the doctor's office.

14. **(1 pt)nauLibrary/setExpLog/a_to_e.pg**
The figure shows the graph of $y = 2\left(\frac{5}{2}\right)^{(t-1)/4}$.



This function can be written as $y = Ce^{kt}$, where $C =$ _____ , and $k =$ _____ .

professor Course: **NSieben_136H**

WeBWorK assignment number 05_sect_17 is due : 09/19/2007 at 02:00am MST.

---

1. **(1 pt)pl/setParametric1Curves/ur_pa_1_1.pg**

Assume time t runs from zero to 2π and that the unit circle has been labled as a clock.

Match each of the pairs of parametric equations with the best description of the curve from the following list. Enter the appropriate letter (A, B, C, D, E, F) in each blank.

A. Starts at 12 o'clock and moves clockwise one time around.
B. Starts at 6 o'clock and moves clockwise one time around.
C. Starts at 3 o'clock and moves clockwise one time around.
D. Starts at 9 o'clock and moves counterclockwise one time around.
E. Starts at 3 o'clock and moves counterclockwise two times around.
F. Starts at 3 o'clock and moves counterclockwise to 9 o'clock.

___1. $x = \cos(2t);\ y = \sin(2t)$
___2. $x = \cos(t);\ y = -\sin(t)$
___3. $x = -\sin(t);\ y = -\cos(t)$
___4. $x = -\cos(t);\ y = -\sin(t)$
___5. $x = \cos\left(\frac{t}{2}\right);\ y = \sin\left(\frac{t}{2}\right)$

---

2. **(1 pt)pl/setParametric1Curves/ur_pa_1_10.pg**

The ellipse

$$\frac{x^2}{2^2} + \frac{y^2}{3^2} = 1$$

can be drawn counterclockwise with the parametric equations. If

$$x = r\cos(t)$$

then r = _____
and y = _____

---

3. **(1 pt)pl/setParametric1Curves/ur_pa_1_11.pg**

A bicycle wheel has radius R. Let P be a point on the spoke of a wheel at a distance d from the center of the wheel. The wheel begins to roll to the right along the the x-axis. The curve traced out by P is given by the following parametric equations:
$x = 22\theta - 13\sin(\theta)$
$y = 22 - 13\cos(\theta)$

What must we have for R and d?

R= _____
d = _____

---

4. **(1 pt)pl/setParametric1Curves/ur_pa_1_12.pg**

Eliminate the parameter t to find a Cartesian equation for:

$$x = t^2$$
$$y = 1 + 4t$$

$$x = Ay^2 + By + C$$

where
A = _____
and B = _____
and C = _____

---

5. **(1 pt)pl/setParametric1Curves/ur_pa_1_3.pg**

Eliminate the parameter t to find a Cartesian equation for

$$x = 9 - t$$
$$y = 3 - 4t$$

The Cartesian equation has the form

$$y = mx + b$$

where $m =$ _____ and $b =$ _____.

---

6. **(1 pt)pl/setHagoodPrecalc/parametricLoop.pg**

The following parametric equations trace out a loop.

$$x = 7 - \frac{5}{2}t^2$$
$$y = -\frac{5}{6}t^3 + 5t + 2$$

Find the t values at which the curve intersects itself:
$t = \pm$ _____.

---

1. **(1 pt)pl/setLimitsRates1TangentVelocity/ns_2_1_5.pg**

A ball is thrown into the air by a baby alien on a planet in the system of Alpha Centauri with a velocity of 46 ft/s. Its height in feet after t seconds is given by $y = 46t - 30t^2$.

A. Find the average velocity for the time period beginning when t=1 and lasting

.01 s:_____

.005 s:_____

.002 s:_____

.001 s:_____

NOTE: For the above answers, you may have to enter 6 or 7 significant digits if you are using a calculator.

B. Estimate the instanteneous velocity when t=1.

_____

---

2. **(1 pt)pl//setLimitsRates1TangentVelocity/ns2_1_5b.pg**

Below is an "oracle" function. An oracle function is a function presented interactively. When you type in a t value, and press the –f–> button, the value $f(t)$ appears in the right hand window. There are three lines, so you can easily calculate three different values of the function at one time.

The function $f(t)$ represents the position (mesured in meters) of a particle at time t (measured in seconds).

The velocity of the particle at time 1.5 is approximately _____ meters per second. You need to give an answer accurate to 1 percent.

t	→	f(t)
Enter t	→	result: $f(t)$
Enter t	→	result: $f(t)$
Enter t	→	result: $f(t)$

Remember this technique for finding velocities. Later we will use the same method to find the derivative of a function.

---

3. **(1 pt)pl/setLimitsRates1TangentVelocity/s1_1_4.pg**

The point $P(0.25, 20)$ lies on the curve $y = 5/x$. If Q is the point $(x, 5/x)$, find the slope of the secant line PQ for the following values of x.

If $x = 0.35$, the slope of PQ is: _____

and if $x = 0.26$, the slope of PQ is: _____

and if $x = 0.15$, the slope of PQ is: _____

and if $x = 0.24$, the slope of PQ is: _____

Based on the above results, guess the slope of the tangent line to the curve at $P(0.25, 20)$. _____

---

4. **(1 pt)pl/setLimitsRates1TangentVelocity/s2_1_8a.pg**

The position, s, of a cat running from a dog down a dark alley as a function of time, t, is given by the values of the table.

t(seconds)	0	1	2	3	4	5
s(feet)	0	15	36	64	93	118

A. Find the average velocity, v_{ave}, of the cat (in ft/sec) for the time period beginning when t = 2 and lasting

a) 3 sec. $v_{ave} =$ _____

b) 2 sec. $v_{ave} =$ _____

c) 1 sec. $v_{ave} =$ _____

B. Given just this table, it is impossible to compute the instantaneous velocity when t = 2 with certainty. Nevertheless, **estimate** the instantaneous velocity of the cat (in ft/sec) when t = 2 by computing the average velocity on the time interval $[1, 3]$.

$v_{ave} =$ _____

---

5. **(1 pt)pl/setDerivatives1/ur_dr_1_3.pg**

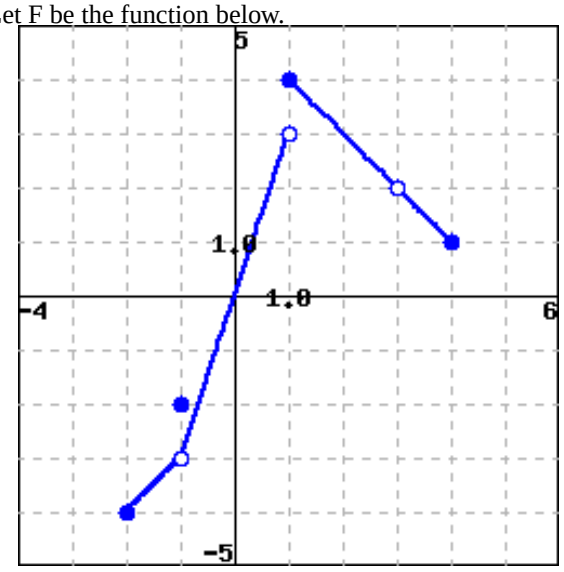
Let $f(x)$ be the function $\frac{1}{x+7}$. Then the quotient $\frac{f(5+h)-f(5)}{h}$ can be simplified to $\frac{-1}{ah+b}$, provided $h \neq 0$, with:

$a =$_____ and $b =$ _____ .

---

6. **(1 pt)pl/setLimitsRates1_5Graphs/ur_lr_1-5_1.pg**

Let F be the function below.



Evaluate each of the following expressions.

Note: Enter 'DNE' if the limit does not exist or is not defined.

a) $\lim_{x \to -1^-} F(x) =$ ___

b) $\lim_{x \to -1^+} F(x) =$ ___

c) $\lim_{x \to -1} F(x) =$ ___

d) $F(-1) =$ ___

e) $\lim_{x \to 1^-} F(x) =$ ___

f) $\lim_{x \to 1^+} F(x) =$ ___

g) $\lim_{x \to 1} F(x) =$ ___

h) $\lim_{x \to 3} F(x) =$ ___

i) $F(3) =$ ___

7. **(1 pt)pl/setLimitsRates1_5Graphs/ur_lr_1-5_2.pg**

Below is an "oracle" function. An oracle function is a function presented interactively. When you type in an x value, and press the –f–> button, the value $f(x)$ appears in the right hand window. There are three lines, so you can easily calculate three different values of the function at one time.

Determine the one-sided limits of the function f at 4.53, and the value of f at 4.53.

$\lim_{x\to 4.53^-} f(x)$ = _____

$f(4.53)$ = _____

$\lim_{x\to 4.53^+} f(x)$ = _____

Are all of these numbers the same?: (Y or N) ___. If so then the function is **continuous** at 4.53.

x	→	f(x)
Enter x	→	result: $f(x)$
Enter x	→	result: $f(x)$
Enter x	→	result: $f(x)$

8. **(1 pt)pl/setLimitsRates2Limits/ns2_2_x.pg**

Let

$$f(x) = \begin{cases} x+5 & \text{if } x \le -2 \\ 5 & \text{if } x > -2 \end{cases}$$

Sketch the graph of this function for yourself and find following limits if they exist (if not, enter DNE).

___1. $\lim_{x\to -2^-} f(x)$

___2. $\lim_{x\to -2^+} f(x)$

___3. $\lim_{x\to -2} f(x)$

9. **(1 pt)pl/setLimitsRates2Limits/ns2_2_xx.pg**

Let

$$f(x) = \begin{cases} 14 & \text{if } x > 10 \\ -1 & \text{if } x = 10 \\ -x+14 & \text{if } -5 \le x < 10 \\ 19 & \text{if } x < -5 \end{cases}$$

Sketch the graph of this function and find following limits if they exist (if not, enter DNE).

___1. $\lim_{x\to 10^-} f(x)$

___2. $\lim_{x\to 10^+} f(x)$

___3. $\lim_{x\to 10} f(x)$

___4. $\lim_{x\to -5^-} f(x)$

___5. $\lim_{x\to -5^+} f(x)$

___6. $\lim_{x\to -5} f(x)$

10. **(1 pt)pl/setLimitsRates2Limits/s1_3_48.pg**

Evaluate the limit

$$\lim_{b\to -16^-} \frac{|b+16|}{b+16}$$

_____

11. **(1 pt)pl/setLimitsRates2Limits/s1_3_18calc.pg**

Evaluate the limit by plotting the function on your calculator and finding the y coordinate of the hole at $x = 2.6$. (Use Zoom Decimal so one of the pixels is at exactly $x = 2.6$. Otherwise, you might not see the hole in the graph. You might also need to set Xres = 1 in the Window page, so that the function gets evaluated at every pixel.)

$\lim_{x\to 2.6} \dfrac{-x^2+4.4x-4.68}{x-2.6}$ = ___

professor Course: **NSieben_136H**

WeBWorK assignment number 07_sect_23 is due : 09/24/2007 at 02:00am MST.

---

1. **(1 pt)pl/setAlgebra17FunComposition/sw4_7_33.pg**

Given that $f(x) = \frac{1}{x}$ and $g(x) = 3x+1$, calculate

(a) $f \circ g(x)$= _____, its domain is all real numbers except _____

(b) $g \circ f(x)$= _____ , its domain is all real numbers except _____

(c) $f \circ f(x)$= _____, its domain is all real numbers except _____

(d) $g \circ g(x)$= _____, its domain is (_____, _____)

Note: If needed enter ∞ as *infinity* and $-\infty$ as *-infinity* .

---

2. **(1 pt)pl/setLimitsRates2Limits/s1_3_16a.pg**

Evaluate the limit by factoring the numerator:

$$\lim_{x\to -1} \frac{x^2+3x+2}{x+1} = \_\_\_\_$$

You might also want to look at the graph of the function, but please practice computing the limit with "pencil and paper."

---

3. **(1 pt)pl/setLimitsRates2Limits/ns_2_3_1.pg**

Let $\lim_{x\to a} g(x) = 0$, $\lim_{x\to a} h(x) = -8$, and $\lim_{x\to a} f(x) = 2$.

Find following limits if they exist. If not, enter DNE ('does not exist') as your answer.

___1. $\lim_{x\to a} g(x)+h(x)$

___2. $\lim_{x\to a} g(x)-h(x)$

___3. $\lim_{x\to a} g(x) * f(x)$

___4. $\lim_{x\to a} \frac{g(x)}{h(x)}$

___5. $\lim_{x\to a} \frac{g(x)}{f(x)}$

___6. $\lim_{x\to a} \frac{f(x)}{g(x)}$

___7. $\lim_{x\to a} \sqrt{h(x)}$

___8. $\lim_{x\to a} h(x)^{-1}$

___9. $\lim_{x\to a} \frac{1}{h(x)-f(x)}$

---

4. **(1 pt)pl/setLimitsRates2Limits/s1_3_36.pg**

Evaluate the limit.

$$\lim_{a\to 5} \frac{\frac{1}{a}-\frac{1}{5}}{a-5} = \_\_\_\_\_$$

---

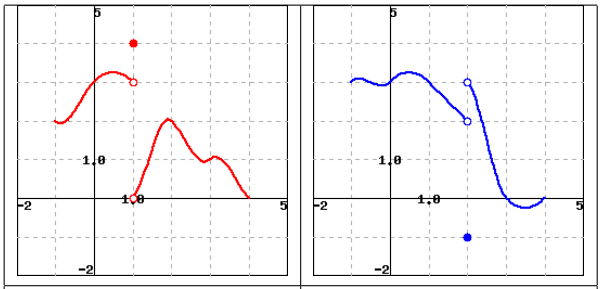
5. **(1 pt)pl/setLimitsRates2Limits/s1_3_5.pg**

Evaluate the limit.

$$\lim_{x\to -3} \frac{x-7}{4x^2-6x+7} = \_\_\_\_\_$$

---

6. **(1 pt)pl/setLimitsRates1_5Graphs/ur_lr_1-5_3b.pg**



The graphs of f and g are given above. Use them to evaluate each quantity below. Write 'DNE' if the limit or value does not exist (or if it's infinity).

___1. $\lim_{x\to 1^+}[f(x)g(x)]$

___2. $\lim_{x\to 2^-}[f(g(x))]$

___3. $\lim_{x\to 2^-}[f(x)g(x)]$

___4. $\lim_{x\to 2^+}[f(x)/g(x)]$

---

7. **(1 pt)pl/setLimitsRates2Limits/ur_lr_2_10b.pg**

a	-1	0	1	2	3	4
$\lim_{x\to a^-} f(x)$	DNE	1	0	3	3	2
$\lim_{x\to a^+} f(x)$	0	1	0	3	3	DNE
$f(a)$	0	1	0	0	3	2
$\lim_{x\to a^-} g(x)$	DNE	2	3	2	0	0
$\lim_{x\to a^+} g(x)$	2	2	0	2	0	DNE
$g(a)$	2	2	-1	2	0	0

Using the table above calcuate the limits below.

Enter 'DNE' if the limit doesn't exist OR if limit can't be determined from the information given.

___1. $\lim_{x\to 2^+}[f(x)g(x)]$

___2. $\lim_{x\to 2^+}[f(x)+g(x)]$

___3. $\lim_{x\to 2^+}[f(x)/g(x)]$

___4. $\lim_{x\to 1^-}[f(x)g(x)]$

---

8. **(1 pt)pl/setLimitsRates2Limits/ur_lr_2_11.pg**

If $10x-44 \le f(x) \le x^2+2x-28$ for all x, then

$\lim_{x\to 4} f(x)$ = _____ .

What theorem did you use to arrive at your answer?

_____

9. **(1 pt)pl/setLimitsRates2Limits/ur_lr_2_14a.pg**

Let $f(s) = \dfrac{3}{s-2} - \dfrac{12}{s^2-4}$.

Note that $\lim\limits_{s\to 2} \dfrac{3}{s-2}$ does not exist, and $\lim\limits_{s\to 2} \dfrac{12}{s^2-4}$ does not exist. Nevertheless, $\lim\limits_{s\to 2} f(s)$ exists. You should understand why this does not violate Limit Law 2.

Evaluate the limit by first putting the two fractions over a common denominator.

$\lim\limits_{s\to 2} f(s) =$ _____ .

10. **(1 pt)pl/setLimitsRates2Limits/s1_3_27a.pg**

Evaluate the limit. Hint: rationalize the denominator.

$\lim\limits_{t\to 81} \dfrac{81-t}{9-\sqrt{t}} =$ _____ .

professor Course: **NSieben_136H**

WeBWorK assignment number 08_sect_24 is due : 09/26/2007 at 02:00am MST.

---

1. **(1 pt)pl/setSwiftCalc/setContinuity4-1-33.pg**

Use interval notation to indicate the set of solutions to the inequality

$$x^2 - 7x - 8 < 0.$$

NOTE: When using interval notation in WeBWorK, remember that:

You use 'INF' for ∞ and '-INF' for $-\infty$.

And use 'U' for the union symbol.

Solution:

_____

---

2. **(1 pt)pl/setLimitsRates2Limits/ur_lr_2_7.pg**

Let $f(x) = \frac{x^2-8x+12}{x^2+4x-12}$.

Calculate $\lim_{x\to 2} f(x)$ by first finding a continuous function which is equal to f everywhere except $x = 2$.

$\lim_{x\to 2} f(x) =$ _____

---

3. **(1 pt)pl/setLimitConcepts/3-2-56.pg**

Evaluate

$$\lim_{h\to 0} \frac{f(3+h) - f(3)}{h},$$

where $f(x) = -4x^2 + 4$.

If the limit does not exist enter DNE.

Limit = _____

---

4. **(1 pt)pl/setContinuity/4-1-23justPoints.pg**

Let

$$f(x) = \frac{6}{x+3}.$$

Find the number(s) a such that f is not continuous at $x = a$.

If you have more than one point, give them in numerical order, from smallest to largest.

If you have extra boxes, fill each in with an 'x'.

Point 1: $a =$ ____

Point 2: $a =$ ____

Point 3: $a =$ ____

---

5. **(1 pt)pl/setContinuity/4-1-28justPoints.pg**

Let

$$f(x) = \frac{x^2+9}{9-x^2}.$$

Find the number(s) a such that f is not continuous at $x = a$.

If you have more than one point, give them in numerical order, from smallest to largest.

If you have extra boxes, fill each in with an 'x'.

Point 1: $a =$ ____

Point 2: $a =$ ____

Point 3: $a =$ ____

---

6. **(1 pt)pl/setContinuity/4-1-31justPoints.pg**

Let

$$f(x) = \frac{5x-5}{x^4 - 14x^3 + 49x^2}.$$

Find the number(s) a such that f is not continuous at $x = a$.

If you have more than one point, give them in numerical order, from smallest to largest.

If you have extra boxes, fill each in with an 'x'.

Point 1: $a =$ ____

Point 2: $a =$ ____

Point 3: $a =$ ____

---

7. **(1 pt)pl/setContinuity/4-1-54.pg**

Let

$$f(x) = \begin{cases} 6x, & x \le 4, \\ x^2, & x > 4. \end{cases}$$

Find the indicated one-sided limits of f, and determine the continuity of f at the indicated point.

NOTE: Type DNE if a limit does not exist.

You should also sketch a graph of $y = f(x)$, including hollow and solid circles in the appropriate places.

$\lim_{x\to 4^-} f(x) =$ _____

$\lim_{x\to 4^+} f(x) =$ _____

$\lim_{x\to 4} f(x) =$ _____

$f(4) =$ _____

Is f continuous at $x = 4$? (YES/NO) _____

---

8. **(1 pt)pl/setContinuity/4-1-55.pg**

Let

$$f(x) = \begin{cases} 1+x, & x < 3, \\ 7-x, & x \ge 3. \end{cases}$$

Find the indicated one-sided limits of f, and determine the continuity of f at the indicated point.

NOTE: Type DNE if a limit does not exist.

You should also sketch a graph of $y = f(x)$, including hollow and solid circles in the appropriate places.

$\lim_{x\to 3^-} f(x) =$ _____

$\lim_{x\to 3^+} f(x) =$ _____

$\lim_{x\to 3} f(x) =$ _____

$f(3) =$ _____

Is f continuous at $x = 3$? (YES/NO) _____

---

9. **(1 pt)pl/setLimitsRates5Continuity/ur_lr_5_6.pg**

Let $f(x) = \begin{cases} 6x - 2, & \text{if } x \le 9 \\ -7x + b, & \text{if } x > 9 \end{cases}$

If $f(x)$ is a function which is continuous everywhere, then we must have

$b =$_____

Now for fun, try to graph $f(x)$.

---

10. **(1 pt)pl/setLimitsRates5Continuity/ur_lr_5_6b.pg**

Let $f(x) = \begin{cases} mx - 13, & \text{if } x < -6 \\ x^2 + 3x - 7, & \text{if } x \geq -6 \end{cases}$

If $f(x)$ is a function which is continuous everywhere, then we must have

$m =$_____

Now for fun, try to graph $f(x)$.

---

11. **(1 pt)pl/setLimitsRates5Continuity/ur_lr_5_4.pg**

A function $f(x)$ is said to have a **jump** discontinuity at $x = a$ if:

1. $\lim_{x \to a^-} f(x)$ exists.

2. $\lim_{x \to a^+} f(x)$ exists.

3. The left and right limits are not equal.

Let $f(x) = \begin{cases} 8x - 2, & \text{if } x < 6 \\ \frac{1}{x+9}, & \text{if } x \geq 6 \end{cases}$

Show that $f(x)$ has a jump discontinuity at $x = 6$ by calculating the limits from the left and right at $x = 6$.

$\lim_{x \to 6^-} f(x) =$_____

$\lim_{x \to 6^+} f(x) =$_____

Now for fun, try to graph $f(x)$.

---

1. **(1 pt)pl/setAlgebra29LogFunctions/srw4_3_45a.pg**

Rewrite the expression

$$\ln 9 + 6\ln x + 4\ln(x^2+7)$$

as a single logarithm. That is, find the function $f(x)$ such that

$$\ln 9 + 6\ln x + 4\ln(x^2+7) = \ln(f(x)).$$

$f(x) =$ _____

---

2. **(1 pt)pl/setLimitsRates3Infinite/s3_5_3.pg**

Evaluate the limit.

$\lim_{x\to\infty} \dfrac{3x+3}{9x^2-9x+11} =$ _____ .

---

3. **(1 pt)pl/setLimitsRates3Infinite/s3_5_4.pg**

Evaluate the limit.

$\lim_{x\to\infty} \dfrac{3x^3-4x^2-9x}{6-11x-9x^3} =$ _____ .

---

4. **(1 pt)pl/setLimitsRates3Infinite/s3_5_5.pg**

Evaluate the limit.

$\lim_{x\to\infty} \dfrac{(4-x)(3+3x)}{(3-11x)(6+2x)} =$ _____ .

---

5. **(1 pt)pl/setLimitsRates3Infinite/s3_5_11.pg**

Evaluate the limit.

$\lim_{x\to\infty} \dfrac{\sqrt{11+5x^2}}{(4+3x)} =$ _____ .

---

6. **(1 pt)pl/setLimitsRates3Infinite/ur_lr_3_13.pg**

Evaluate the following limits. If needed, enter INF for ∞ and MINF for $-\infty$.

(a) $\lim_{x\to\infty} \left(\sqrt{x^2-8x+1}-x\right) =$ _____ .

(b) $\lim_{x\to-\infty} \left(\sqrt{x^2-8x+1}-x\right) =$ _____ .

---

7. **(1 pt)pl/setContinuity/4-1-23.pg**

Let

$$f(x) = \frac{1}{x+5}.$$

Find each point of discontinuity of f, and for each give the value of the point of discontinuity and evaluate the indicated one-sided limits.

NOTE: Use 'INF' for ∞ and '-INF' for $-\infty$.

If you have more than one point, give them in numerical order, from smallest to largest.

If you have extra boxes, fill each in with an 'x'.

Point 1: $C =$ _____

$\lim_{x\to C^-} f(x) =$ _____

$\lim_{x\to C^+} f(x) =$ _____

Point 2: $C =$ _____

$\lim_{x\to C^-} f(x) =$ _____

$\lim_{x\to C^+} f(x) =$ _____

Point 3: $C =$ _____

$\lim_{x\to C^-} f(x) =$ _____

$\lim_{x\to C^+} f(x) =$ _____

---

8. **(1 pt)pl/setContinuity/4-1-28.pg**

Let

$$f(x) = \frac{x^2+1}{1-x^2}.$$

Find each point of discontinuity of f, and for each give the value of the point of discontinuity and evaluate the indicated one-sided limits.

NOTE: Use 'INF' for ∞ and '-INF' for $-\infty$.

If you have more than one point, give them in numerical order, from smallest to largest.

If you have extra boxes, fill each in with an 'x'.

Point 1: $C =$ _____

$\lim_{x\to C^-} f(x) =$ _____

$\lim_{x\to C^+} f(x) =$ _____

Point 2: $C =$ _____

$\lim_{x\to C^-} f(x) =$ _____

$\lim_{x\to C^+} f(x) =$ _____

Point 3: $C =$ _____

$\lim_{x\to C^-} f(x) =$ _____

$\lim_{x\to C^+} f(x) =$ _____

---

9. **(1 pt)pl/setLimitsRates3Infinite/ur_lr_3_15.pg**

A function is said to have a **vertical asymptote** wherever the limit on the left or right (or both) is either positive or negative infinity.

For example, the function $f(x) = \frac{-2x+1}{(x-7)^2}$ has a vertical asymptote at $x = 7$.

For each of the following limits, enter either 'P' for positive infinity, 'N' for negative infinity, or 'D' when the limit simply does not exist.

$\lim_{x\to 7^-} \dfrac{-2x+1}{(x-7)^2} =$ ___

$\lim_{x\to 7^+} \dfrac{-2x+1}{(x-7)^2} =$ ___

$\lim_{x\to 7} \dfrac{-2x+1}{(x-7)^2} =$ ___

10. **(1 pt)pl/setLimitsRates3Infinite/ur_lr_3_16.pg**

A function is said to have a **vertical asymptote** wherever the limit on the left or right (or both) is either positive or negative infinity.

For example, the function $f(x) = \frac{x^2+1}{x^2-10x+25}$ has a vertical asymptote at $x = 5$.

For each of the following limits, enter either 'P' for positive infinity, 'N' for negative infinity, or 'D' when the limit simply does not exist.

$\lim_{x\to 5^-} \dfrac{x^2+1}{x^2-10x+25} =$ ___

$\lim_{x\to 5^+} \dfrac{x^2+1}{x^2-10x+25} =$ ___

$\lim_{x\to 5} \dfrac{x^2+1}{x^2-10x+25} =$ ___

11. **(1 pt)pl/setContinuity/4-1-25.pg**

Let

$$f(x) = \frac{x^2+6}{x^2-1}.$$

Find the indicated one-sided limits of f.

NOTE: Remember that you use 'INF' for ∞ and '-INF' for $-\infty$. You should also sketch a graph of $y = f(x)$, including vertical and horizontal asymptotes.

$\lim_{x\to -1^-} f(x) =$ _____

$\lim_{x\to -1^+} f(x) =$ _____

$\lim_{x\to 1^-} f(x) =$ _____

$\lim_{x\to 1^+} f(x) =$ _____

$\lim_{x\to -\infty} f(x) =$ _____

$\lim_{x\to \infty} f(x) =$ _____

12. **(1 pt)pl/setContinuity/4-1-29.pg**

Let

$$f(x) = \frac{x^2-3x-18}{x^2+11x+24}.$$

Find the indicated one-sided limits of f.

NOTE: Remember that you use 'INF' for ∞ and '-INF' for $-\infty$. You should also sketch a graph of $y = f(x)$, including vertical and horizontal asymptotes.

$\lim_{x\to -8^-} f(x) =$ _____

$\lim_{x\to -8^+} f(x) =$ _____

$\lim_{x\to -3^-} f(x) =$ _____

$\lim_{x\to -3^+} f(x) =$ _____

$\lim_{x\to -\infty} f(x) =$ _____

$\lim_{x\to \infty} f(x) =$ _____

professor Course: **NSieben_136H**

WeBWorK assignment number 10_sect_26_27 is due : 10/03/2007 at 02:00am MST.

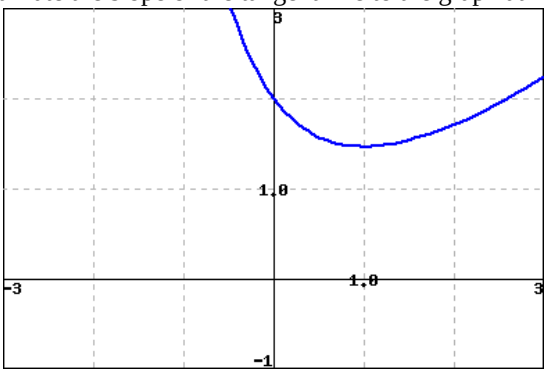
1. **(1 pt)pl/setLimitsRates6Rates/c1s1p2a.pg**

Let $p(x) = 5.8 \cdot x^{1.6}$. Use a calculator or computer to find the slope of the tangent line to $y = p(x)$ at the point $(0.5, p(0.5))$.

$m =$ _____. Give the slope accurate to the nearest thousandth.

2. **(1 pt)nauLibrary/setCalcI/slope_from_graph.pg**

Estimate the slope of the tangent line to the graph at $x = 0$.



The slope is approximately ___ . (Your answer needs to be within 0.05 of the true slope to be correct. So, rounding your answer to the nearest tenth is sufficient.)

3. **(1 pt)pl/setDerivativeFunction/s1_6_8a.pg**

The slope of the tangent line to the parabola $y = 2x^2 - 3x + 7$ at the point $(2, 9)$ is: _____

The equation of this tangent line can be written in the form $y = m(x-2) + y_0$

where $m =$ _____

and $y_0 =$ _____ .

4. **(1 pt)pl/setDerivativeFunction/s1_6_4a.pg**

The slope of the tangent line to the curve $y = \frac{3}{x}$ at the point $(4, 3/4)$ is: _____

The equation of this tangent line can be written in the form $y = mx + b$, where $m =$ _____

and $b =$ _____

5. **(1 pt)pl/setSwiftCalc/setDerivativeFunctions2_1_7.pg**

If $f(x) = 7 + 6x - 2x^2$, find an equation of the line tangent to the curve $y = f(x)$ at $x = 3$.

The tangent line is $y =$ _____

6. **(1 pt)pl/setLimitsRates6Rates/s1_6_14.pg**

The displacement (in meters) of a particle moving in a straight line is given by $s = 2t^3$ where t is measured in seconds. Find the average velocity of the particle over the time interval $[10, 13]$.

_____

Find the (instantaneous) velocity of the particle when $t = 10$.

_____

7. **(1 pt)pl/setDerivativeBasicFunctions/3-4-33.pg**

Suppose that $f(x) = 3x^2 - 2x + 6$. Evaluate each of the following:

$f'(7)$ = _____

$f'(-6)$ = _____

8. **(1 pt)pl/setDerivativeFunction/prob9.pg**

Let

$$f(x) = \sqrt{x+2}$$

Use the definition of the derivative find

(i) $f'(-1)$ _____

(ii) $f'(2)$ _____

(iii) $f'(7)$ _____

9. **(1 pt)pl/setDerivativeFunction/s2_1_26.pg**

If $f(x) = \frac{2}{x^2}$, find $f'(3)$.

_____

10. **(1 pt)pl/setDerivativeBasicFunctions/ur_dr_1_5_4a.pg**

If $f(x) = 2x + \frac{3}{x}$, then $f'(4) =$ _____

Use this to find an equation of the tangent line to the curve $y = 2x + \frac{3}{x}$ at $x = 4$. The equation of this tangent line can be written in the form $y = m * (x-4) + y_0$ where m is: _____ and where y_0 is: _____

11. **(1 pt)pl/setDerivativeFunction/ns2_7_4.pg**

If the tangent line to $y = f(x)$ at (-4, 7) passes through the point (0, -5), find

A. $f(-4) =$ _____

B. $f'(-4) =$ _____

12. **(1 pt)pl/setLimitsRates6Rates/ur_lr_6_2a.pg**

The following chart shows "living wage" jobs in Flagstaff per 1000 working age adults over a 5 year period.

Year	2000	2001	2002	2003	2004
Jobs	630	660	685	705	720

What is the average rate of change in the number of living wage jobs from 2000 to 2002?____Jobs/Year

What is the average rate of change in the number of living wage jobs from 2002 to 2004?____Jobs/Year

Based on these two answers, should the mayor from the last two years be reelected?

(These numbers are made up. Please do not actually hold the mayor accountable.)

---

1. **(1 pt)pl/setDerivativeFunction/3-3-05.pg**

Suppose that

$$f(x+h)-f(x)=4hx^2+2hx-2h^2x+4h^2-6h^3.$$

Find $f'(x)$.

$f'(x)=$ _____

---

2. **(1 pt)pl/setDerivativeFunction/3-3-21.pg**

Let $f(x)=-4x+6x^2$. Then the expression

$$\frac{f(x+h)-f(x)}{h}$$

can be written in the form $Ah+Bx+C$, where A, B, and C are constants. (Note: It's possible for one or more of these constants to be 0.) Find the constants.

$A=$ ___

$B=$ ___

$C=$ ___

Use your answer from above to find $\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$.

$\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}=$ _____

---

3. **(1 pt)pl/setDerivativeFunction/3-3-25.pg**

Let $f(x)=\frac{-2}{2x+2}$. Then the expression

$$\frac{f(x+h)-f(x)}{h}$$

can be written in the form

$$\frac{A}{(Bx+Ch+2)(Dx+2)},$$

where A, B, C, and D are constants. (Note: It's possible for one or more of these constants to be 0.) Find the constants.

$A=$ _____

$B=$ _____

$C=$ _____

$D=$ _____

Use your answer from above to find $\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$.

$\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}=$ _____

Finally, find each of the following:

$f'(1)=$ _____

$f'(2)=$ _____

$f'(3)=$ _____

---

4. **(1 pt)pl/setDerivativeFunction/3-3-23.pg**

Let $f(x)=5\sqrt{x}+7$. Then the expression

$$\frac{f(x+h)-f(x)}{h}$$

can be written in the form

$$\frac{A}{\left(\sqrt{Bx+Ch}\right)+\left(\sqrt{x}\right)},$$

where A, B, and C are constants. (Note: It's possible for one or more of these constants to be 0.) Find the constants.

$A=$ _____

$B=$ _____

$C=$ _____

Use your answer from above to find $\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$.

$\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}=$ _____

Finally, find each of the following:

$f'(1)=$ _____

$f'(2)=$ _____

$f'(3)=$ _____

---

5. **(1 pt)pl/setDerivativeFunction/ns2_8_10.pg**

Let

$$f(x)=3x^3+9x-4$$

Use the definition of the derivative to calculate the derivative of f:

$f'(x)=$ _____.

Use the definition of the derivative to calculate the derivative of f' (i.e. the second derivative of f):

$f''(x)=$ _____.

WeBWorK just looks at the answer, but on exams you will be tested on your syntax. As you do this problem, and during exams, be sure to write "lim" where it is needed.

---

6. **(1 pt)pl/setDerivativeFunction/3-3-35.pg**

Suppose that $f(x)=-5x^2+8x$.

(A) Find $f'(x)$.

$f'(x)=$ _____

Find the slope of the tangent lines to the graph of f at each of the following values of x:

(B) Slope at $x=1$: _____

(C) Slope at $x=5$: _____

(D) Slope at $x=8$: _____

---

7. **(1 pt)pl/setSwiftCalc/setDerivativeFunction3-3-37v2.pg**

Suppose that an object moves along the y-axis so that its location is $y=3t^2-8t$ at time t. (Here y is in feet and t is in seconds.) Find the velocity (include units) of the object at each of following times:

(A) Velocity at $t=3$ seconds: _____

(B) Velocity at $t=6$ seconds: _____

(C) Velocity at $t=8$ seconds: _____

When giving the units, use "ft" for feet and "s" for seconds. You need to put a space between the number and the "ft".

8. **(1 pt)pl/setDerivativeFunction/3-3-52.pg**

Let

$$f(x) = \begin{cases} -5x, & x < 2, \\ -8 - x, & x \geq 2. \end{cases}$$

(A) Sketch the graph of f, and when you're done, place a "1" in the box: ___

(B) Find the value of x where f is discontinuous. If there is no value, enter 'NONE'.

x-values = _____

(C) Find the value of x where f is nondifferentiable. If there is no value, enter 'NONE'.

x-values = _____

9. **(1 pt)pl/setDerivativeFunction/3-3-53.pg**

Let

$$f(x) = \begin{cases} x^2 + 7, & x < 0, \\ 7, & x \geq 0. \end{cases}$$

(A) Sketch the graph of f, and when you're done, place a "1" in the box: ___

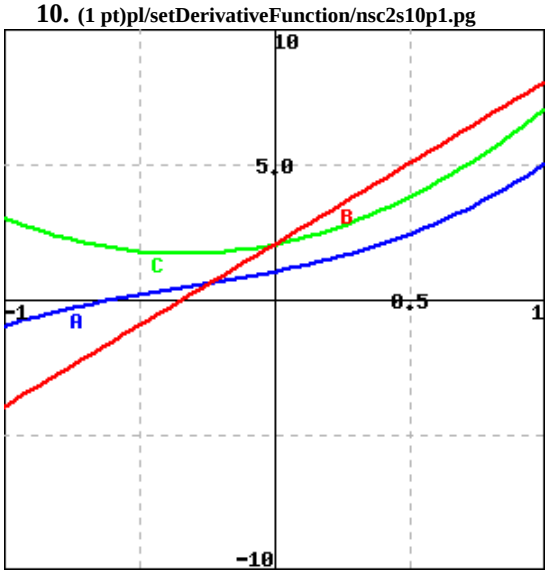
(B) Find the value of x where f is discontinuous. If there is no value, enter 'NONE'.

x-values = _____

(C) Find the value of x where f is nondifferentiable. If there is no value, enter 'NONE'.

x-values = _____

10. **(1 pt)pl/setDerivativeFunction/nsc2s10p1.pg**



Identify the graphs A (blue), B(red) and C (green) as the graphs of a function and its derivatives:

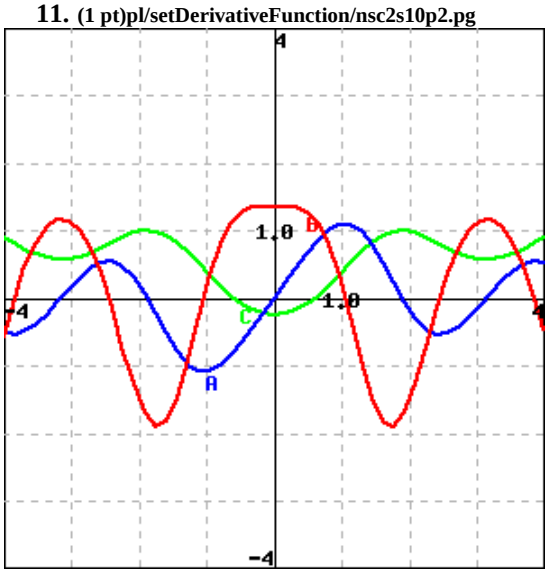
___ is the graph of the function, $f(x)$.

___ is the graph of the function's first derivative, $f'(x)$.

___ is the graph of the function's second derivative, $f''(x)$.

(Remember that $f'(x)$ is itself a *function* , and we can find the derivative of the function $f'(x)$ which is called the second derivative of the function $f(x)$ and denoted by $f''(x)$.)

11. **(1 pt)pl/setDerivativeFunction/nsc2s10p2.pg**



Identify the graphs A (blue), B(red) and C (green) as the graphs of a function and its derivatives:

___ is the graph of the function

___ is the graph of the function's first derivative

___ is the graph of the function's second derivative

12. **(1 pt)nauLibrary/setCalcI/d_exp_from_def.pg**

The definition of the derivative, applied to $f(x) = 7^x$, results in the formula $f'(x) = k * 7^x$ where

$$k = \lim_{h \to 0} \frac{7^h - 1}{h}.$$

The value k cannot be determined using the usual tricks for evaluating limits. Using your calculator, approximate the constant k, rounded to three significant figures. $k \approx$ _____ .

1. **(1 pt)pl/setDerivatives2Formulas/s2_2_1.pg**
Let f be defined by $f(x) = 4x^2 - 3x - 13$.
$f'(x) =$ _____ .
$f'(2) =$ _____ .

2. **(1 pt)pl/setDerivatives2Formulas/ur_dr_2_2.pg**
$\frac{d}{dx}(3e^x - 9x^5 + 38) =$ _____ .

3. **(1 pt)pl/setDerivatives2Formulas/s2_2_7.pg**
If $f(t) = 4t^{-7}$, then $f'(t) =$ _____
and $f'(5) =$ _____ .

4. **(1 pt)pl/setDerivatives2Formulas/d2a.pg**
Let $f(x) = -2e^{x-3} + e^5$.
$f'(x) =$ _____
[NOTE: A small algebraic manipulation is needed first to get $f(x)$ into a form so that the derivative can be taken.]

5. **(1 pt)pl/setDerivatives2Formulas/s2_2_22b.pg**
If $f(x) = 5 + \frac{6}{x} + \frac{4}{x^2}$, then $f'(x) =$ _____ .

6. **(1 pt)pl/setDerivatives2Formulas/s2_2_17.pg**
If $f(x) = \sqrt{10x}$, then $f'(x) =$ _____ .
Therefore, $f'(3) =$ _____ .

7. **(1 pt)pl/setDerivatives2Formulas/s2_2_11b.pg**
Let $f(x) = -2x^6\sqrt{x} + \frac{2}{x^3\sqrt{x}}$.
$f'(x) =$ _____ .

8. **(1 pt)pl/setDerivatives2Formulas/s2_2_15b.pg**
$\frac{d}{dx}\left(\frac{4x^2+7x+6}{\sqrt{x}}\right) =$ _____ .

9. **(1 pt)pl/setDerivatives2Formulas/s2_2_33a.pg**
If $f(x) = \frac{4x^3 - 3}{x^4}$, find $f'(x)$.
$f'(x) =$ _____.

10. **(1 pt)pl/setDerivatives13Higher/s2_7_10a.pg**
Let $h(t) = 5t^{3.2} - 6t^{-3.2}$. Then
$h'(t) =$ _____ , and
$h''(t) =$ _____ .

11. **(1 pt)pl/setDerivatives13Higher/ur_dr_13_2f.pg**
$\frac{d}{dx}(5x^3 - 5e^x) =$ _____ .
$\frac{d^2}{dx^2}(5x^3 - 5e^x) =$ _____ .

12. **(1 pt)pl/setDerivatives13Higher/ur_dr_13_6.pg**
If $g(t) = -t^4 + 8t^2 - 3$ evaluate g and its first 5 derivatives at 0.
$g(0) =$ _____ .
$g'(0) =$ _____ .
$g''(0) =$ _____ .
$g'''(0) =$ _____ .
$g^{(4)}(0) =$ _____ .
$g^{(5)}(0) =$ _____ .

13. **(1 pt)pl/setDerivatives1_5Tangents/ur_dr_1_5_14.pg**
Given

$$f(x) = x + \sqrt{x}$$

Calculate the tangent line to $y = f(x)$ at the point $(16, 20)$.
$y =$ ___$(x - 16) + 20$

14. **(1 pt)nauLibrary/setCalcI/quadraticTanLine.pg**
Let f be defined by $f(x) = 3x^2 + 3x - 3$.
$f'(x) =$ _____ .
An equation for the tangent line to $y = f(x)$ at $x = 4$ is
$y =$ _____ .

15. **(1 pt)nauLibrary/setCalcI/quadraticTanLine_a.pg**
Let f be defined by $f(x) = -2x^2 - 5x - 2$, and let a be any constant.
$f(a) =$ _____ and $f'(a) =$ _____ . (These two answers will depend on the constant a.)
An equation for the tangent line to $y = f(x)$ at $x = a$ is
$y =$ _____ . (This answer will depend on the variable x and the constant a.)

16. **(1 pt)pl/setDerivatives1_5Tangents/ur_dr_1_5_8.pg**
The parabola $y = x^2 + 5$ has two tangents which pass through the point $(0, -5)$. One is tangent to the parabola at $(A, A^2 + 5)$ and the other at $(-A, A^2 + 5)$. Find the (positive) number A.
$A =$ _____

17. **(1 pt)pl/setDerivatives1_5Tangents/ur_dr_1_5_9.pg**
The graph of $f(x) = 2x^3 + 9x^2 - 60x + 14$ has two horizontal tangents. One occurs at a negative value of x and the other at a positive value of x. What is the negative value of x where a horizontal tangent occurs? ___
What is the positive value of x where a horizontal tangent occurs? ___

professor Course: **NSieben_136H**

WeBWorK assignment number 13_sect_32 is due : 10/15/2007 at 02:00am MST.

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1. **(1 pt)pl/setDerivatives2Formulas/ns3_2_4a.pg**

Find the derivative of the function

$$g(x) = (2x^2 + 4x)e^x$$

$g'(x) =$ _____

It is often important in calculus to factor your derivatives as much as possible. You might have written g' as a sum of two terms. The next part forces you to write it as a simplified factor of two terms.

The answer can be written as $g'(x) = (Ax^2 + Bx + C)e^x$, where $A =$ ___, $B =$ ___, and $C =$ ___.

---

2. **(1 pt)pl/setDerivatives2Formulas/ns3_2_5.pg**

Find the derivative of the function

$$g(x) = \frac{e^x}{4 + 5x}$$

$g'(x) =$ _____

---

3. **(1 pt)pl/setDerivatives2Formulas/s2_2_13b.pg**

Use the product rule to differentiate $f(t) = (t^2 - 6t - 3)(2t^2 - 7t + 3)$.

$f'(t) =$ _____ .

Note: For this problem you may write the answer as a sum of two terms, as given by the product rule, and you do not need to simplify the expression.

---

4. **(1 pt)pl/setDerivatives2Formulas/s2_2_11new.pg**

$\frac{d}{dx}\left(\frac{3x+3}{2x+5}\right) =$ _____ .

---

5. **(1 pt)pl/setDerivatives1/c1s5p8b.pg**

Constructing new functions from old ones and calculating the derivative of the new function from the derivatives of the old functions:

From the table below calculate the quantities asked for:

x	1	-21	0	-2	-28
$f(x)$	3	-18983	1	-21	-44715
$g(x)$	-1	-19427	-2	-28	-45502
$f'(x)$	5	2689	1	29	4761
$g'(x)$	3	2731	1	33	4817

_____ $= (fg)(0)$
_____ $= f(-2)/(g(-2)+5)$
_____ $= (f+g)'(-2)$
_____ $= (fg)'(-2)$

---

6. **(1 pt)pl/setDerivatives1_5Tangents/ur_dr_1_5_7a.pg**

Let $f(x) = \frac{3x}{3x^2+2}$. The derivative of f is $f'(x) =$ _____ .

So, $f(3) =$ ____ and $f'(3) =$ ____ . Use this to find an equation of the tangent line to the curve $y = f(x)$ at $x = 3$

$y =$ _____ .

---

7. **(1 pt)pl/setDerivatives2Formulas/ur_dr_2_1b.pg**

Given

$$f(x) = \frac{x^2}{x^2 + 5},$$

the derivative function can be simplified to

$$f'(x) = \frac{Ax^2 + Bx + C}{(x^2 + D)^2},$$

where $A =$ ____, $B =$ ____, $C =$ ____, and $D =$ ____.

---

8. **(1 pt)pl/setDerivatives2Formulas/d3.pg**

Given that

$$f(x) = x^8 h(x)$$
$$h(-1) = 3$$
$$h'(-1) = 6$$

it follows that $f'(-1) =$ _____

[HINT: Use the product rule and the power rule.]

---

9. **(1 pt)pl/setDerivatives2Formulas/s2_2_11a.pg**

Let $f(x) = \frac{4}{6x+2}$.

$f'(x) =$ _____

---

10. **(1 pt)nauLibrary/setCalcI/hzntl_quot_rule.pg**

The graph $y = \frac{3x+6}{e^x}$ has a horizontal tangent at $x =$ ____ .

---

11. **(1 pt)nauLibrary/setCalcI/producte2x.pg**

Use the product rule to differentiate.

$\frac{d}{dx}(e^{2x}) = \frac{d}{dx}(e^x \cdot e^x) =$ _____ .

Now, use the product rule again to differentiate.

$\frac{d}{dx}(e^{3x}) = \frac{d}{dx}(e^x \cdot e^{2x}) =$ _____ .

---

12. **(1 pt)nauLibrary/setCalcI/secondDerProduct.pg**

Let $f(x) = (-2x^2 + 3x - 5)e^x$. Compute the following derivatives.

$f'(x) =$ _____ . Simplify this before finding the second derivative.

$f''(x) =$ _____ .

professor Course: **NSieben_136H**

WeBWorK assignment number 14_sect_33 is due : 10/17/2007 at 02:00am MST.

1. **(1 pt)pl/setDerivatives3WordProblems/s2_3_24.pg**

The population of a slowly growing bacterial colony after t hours is given by $p(t) = 5t^2 + 22t + 200$. The instantaneous growth rate after 4 hours is _____ bacteria per hour.

2. **(1 pt)pl/setDerivatives3WordProblems/s2_3_1.pg**

A particle moves along a straight line and its position at time t is given by $s(t) = 2t^3 - 18t^2 + 30t$ where s is measured in feet and t in seconds.

Find the velocity (in ft/sec) of the particle at time $t = 0$: _____

The particle stops moving (i.e. is in a rest) twice, once when $t = A$ and again when $t = B$ where $A < B$. A is _____ and B is _____

What is the position of the particle at time 12? _____

Finally, what is the TOTAL distance the particle travels between time 0 and time 12? _____

3. **(1 pt)pl/setDerivatives3WordProblems/s2_3_10a.pg**

The area of a square with side length s meters is $A = s^2$ square meters. The rate of change of the area of a square with respect to its side length is $\frac{dA}{ds}$ = ___ square meters per meter.

4. **(1 pt)pl/setDerivatives3WordProblems/s2_3_27a.pg**

The cost of producing x stuffed alligator toys is $c(x) = 0.003x^2 + 1.3x + 1414$ dollars. The marginal cost, when 1454 alligators have been produced, is _____ dollars per alligator.

5. **(1 pt)pl/setDerivatives3WordProblems/s2_3_8.pg**

If a ball is thrown vertically upward from the roof of 32 foot building with a velocity of 64 ft/sec, its height s after t seconds is $s = 32 + 64t - 16t^2$ feet. The ball reaches a maximum height of ____ feet. The velocity of the ball when it hits the ground (height = 0) is _____ feet per second.

Note: You may have to use the quadratic formula.

6. **(1 pt)pl/setDerivatives3WordProblems/c2s7p2.pg**

A particle moves along a straight line with equation of motion $s = t^5 - 4t^4$. The acceleration of the particle is 0 at $t = 0$ and at $t =$ _____ .

7. **(1 pt)pl/setDerivatives3WordProblems/c2s3p1a.pg**

The mass of the part of a rod that lies between its left end and a point x meters to the right is $m = 1.5x + 0.6x^{1.6}$ kg. The linear density of the rod, $\frac{dm}{dx}$, varies with position. The linear density at $x = 0.1$ meters from the left end is _____ kg/meter, and at $x = 1.5$ meters the density is _____ kg/meter

1. **(1 pt)nauLibrary/setCalcI/trigTanLines.pg**

In this problem, please evaluate the trig functions without a calculator and do not use a decimal point in your answer.

An equation of the tangent line to the curve $y = \sin(x)$ at $x = \pi$ is

$y =$ ___ + ___ $\cdot(x - \pi)$.

An equation of the tangent line to the curve $y = \cos(x)$ at $x = 4\pi/3$ is

$y =$ ___ + ___ $\cdot(x - 4\pi/3)$.

---

2. **(1 pt)pl/setDerivatives4Trig/s2_4_7.pg**

Evaluate $\lim_{x\to 0} \dfrac{\sin 2x}{7x} =$ ___ .

Hint: You may use the fact, proved in the book, that $\lim_{x\to 0} \dfrac{\sin x}{x} = 1$.

---

3. **(1 pt)pl/setDerivatives4Trig/s2_4_21a.pg**

Let $f(x) = 7\sin x + 7\cos x$. Evaluate

$f'(x) =$ _____

$f'(-\frac{\pi}{4}) =$ _____

---

4. **(1 pt)pl/setDerivatives4Trig/s2_4_33.pg**

Find the equation of the tangent line to the curve $y = 3\tan x$ at the point $(\pi/4, 3)$. The equation of this tangent line can be written in the form $y = mx + b$ where m is: _____

and where b is: _____

---

5. **(1 pt)pl/setDerivatives4Trig/s2_4_20.pg**

If $f(x) = \cos x - 4\tan x$, then

$f'(x) =$ _____

and $f'(4) =$ _____ .

---

6. **(1 pt)pl/setDerivatives4Trig/s2_4_24.pg**

If

$$f(x) = \frac{3\sin x}{1 + \cos x}$$

find $f'(x)$.

$f'(x) =$ _____

Find $f'(3)$.

$f'(3) =$ _____

---

7. **(1 pt)pl/setDerivatives4Trig/s2_4_26.pg**

If $f(x) = \dfrac{\tan x - 4}{\sec x}$, then

$f'(x) =$ _____ and

$f'(4) =$ _____ .

---

8. **(1 pt)pl/setDerivatives4Trig/s2_4_27.pg**

If $f(x) = 5x(\sin x + \cos x)$, then

$f'(x) =$ _____ and

$f'(2) =$ _____ .

---

9. **(1 pt)pl/setDerivatives3WordProblems/s2_7_41_noChainRule.pg**

A mass attached to a vertical spring has position function given by $s(t) = 3\sin(t)$ where t is measured in seconds and s in inches. This is an example of simple harmonic motion.

Find the velocity at $t = 5$.

$v(5) =$ _____ inches per second.

Find the acceleration at $t = 5$.

$a(5) =$ _____ inches per second per second.

---

10. **(1 pt)pl/setDerivatives4Trig/s2_4_35.pg**

Find the equation of the tangent line to the curve $y = 4x\cos x$ at the point $(\pi, -4\pi)$.

The equation of this tangent line can be written in the form $y = mx + b$ where

$m =$ _____

and $b =$ _____

---

11. **(1 pt)pl/setDerivatives4Trig/s2_7_32.pg**

Find the 56th derivative of $f(x) = \sin(x)$ by finding the first few derivatives and observing the pattern that occurs.

$f^{(56)}(x) =$ ___

---

12. **(1 pt)pl/setDerivatives4Trig/ur_dr_4_1a.pg**

Let $f(x) = \dfrac{4\sin x}{2\sin x + 4\cos x}$.

Then $f'(x) =$ _____.

An equation of the tangent line to $y = f(x)$ at $x = \pi/3$ is

$y =$ _____.

professor Course: **NSieben_136H**

WeBWorK assignment number 16_sect_35 is due : 10/20/2007 at 02:00am MST.

1. **(1 pt)pl/setAlgebra17FunComposition/sw4_7_45.pg**
Express the function $h(x) = (x+6)^8$ in the form $f \circ g$. If $f(x) = x^8$, find the function $g(x)$.
Your answer is $g(x)$= _____,

2. **(1 pt)nauLibrary/setCalcI/chainLeibnitz.pg**
Suppose $y = \sin(-2x^2+5x+5)$. We can write $y = \sin(u)$, where $u =$ _____ . The Leibnitz notation for the chain rule is $\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$. The factors are $\frac{dy}{du} =$ _____ (written as a function of u) and $\frac{du}{dx} =$ _____ . Now substitue in the function of x for u to get
$\frac{dy}{dx} =$ _____ (written as a function of x).

3. **(1 pt)pl/setDerivatives5ChainRule/s2_5_2.pg**
Let
$$f(x) = (x^3+3x+7)^4$$
$f'(x) =$ _____
$f'(1) =$ _____

4. **(1 pt)nauLibrary/setCalcI/growingBall.pg**
If the radius of a sphere is increasing at a constant rate of 3 cm/sec, then the volume is increasing at a rate of _____ cm^3/sec when the radius is 4 cm.
Hint: $\frac{dV}{dt} = \frac{dV}{dr} \cdot \frac{dr}{dt}$, and the volume of a sphere is $V = \frac{4}{3}\pi r^3$.

5. **(1 pt)pl/setDerivatives5ChainRule/s2_5_4a.pg**
If $f(x) = \sin(x^2)$, then $f'(x) =$ _____ .

6. **(1 pt)pl/setDerivatives5ChainRule/s2_5_5a.pg**
$\frac{d}{dx}\sin^2 x =$ _____ .

7. **(1 pt)pl/setDerivatives5ChainRule/ur_dr_5_14.pg**
Let
$$f(x) = \sin(3x+4)$$
$f'(x) =$ _____

8. **(1 pt)pl/setDerivatives5ChainRule/s2_5_8a.pg**
Let
$$f(x) = \sqrt{3x^2+4x+2}$$
$f'(x) =$ _____
The curve $y = f(x)$ has a horizontal tangent at $x =$ _____ .

9. **(1 pt)pl/setDerivatives5ChainRule/s2_5_7.pg**
If $f(x) = \tan 4x$, find $f'(x)$ and $f'(4)$.
$f'(x) =$ _____ .
$f'(4) =$ _____ .

10. **(1 pt)pl/setDerivatives5ChainRule/ur_dr_5_18a.pg**
$\frac{d}{dx}\left(8e^{x\sin x}\right) =$ _____

11. **(1 pt)pl/setDerivatives5ChainRule/s2_5_3.pg**
If $f(x) = (4x+3)^{-2}$, then
$f'(x) =$ _____ , and
$f'(5) =$ _____

12. **(1 pt)pl/setDerivatives5ChainRule/ur_dr_5_17.pg**
Let
$$f(x) = 7\cos(\cos(x^2))$$
$f'(x) =$ _____

13. **(1 pt)pl/setDerivatives5ChainRule/derchr2.pg**

Let $F(x) = f(f(x))$ and $G(x) = (F(x))^2$. You also know that $f(6) = 12, f(12) = 3, f'(12) = 9, f'(6) = 15$.
Find $F'(6) =$ _____ and $G'(6) =$ _____.

14. **(1 pt)nauLibrary/setCalcI/chainrule1.pg**
Let
$$f(x) = e^{-4x^2+2x-1}.$$
The derivative of f is $f'(x) =$ _____.
An equation for the tangent line to the curve $y = f(x)$ at $x = 1$ is
$y =$ _____.

15. **(1 pt)pl/setDerivatives3WordProblems/s2_7_41a.pg**
A mass attached to a vertical spring has position function given by $s(t) = 4\sin(4t+6.2)+4$ where t is measured in seconds and s in inches. This is an example of simple harmonic motion.
Find the velocity at time t.
$v(t) =$ _____ inches per second.
Find the acceleration at time t.
$a(t) =$ _____ inches per second per second.

16. **(1 pt)pl/setDerivatives1/c1s5p8c.pg**
This problem tests calculating new functions from old ones:
From the table below calculate the quantities asked for:

x	1	3	-6	-68	-1
$f(x)$	-6	-68	400	624306	0
$g(x)$	-1	1	-8	-70	-3
$f'(x)$	-9	-61	-205	-27609	-5
$g'(x)$	1	1	1	1	1

_____ $= (f \circ f)'(3)$.
_____ $= (f \circ f)(1)$.
_____ $= (g \circ f)'(1)$.

17. **(1 pt)nauLibrary/setCalcI/gaussian.pg**
Let $f(x) = e^{-2x^2}$. Then, $f''(x) =$ _____. The solutions to $f''(x) = 0$ are $x = \pm$ _____.

professor Course: **NSieben_136H**

WeBWorK assignment number 17_sect_36 is due : 10/24/2007 at 02:00am MST.

---

1. **(1 pt)nauLibrary/setCalcI/implicit1pretty.pg**

Use implicit differentiation to find the derivative of the family of curves

$$\sin(xy)+x^5+y=c.$$

$\frac{dy}{dx}=$ _____.

Note: your answer will be a function of x and y. If you take differential equations, you will learn how to get the family of curves starting with the formula for $\frac{dy}{dx}$.

---

2. **(1 pt)pl/setDerivatives2_5Implicit/s2_6_19c.pg**

Use implicit differentiation to find the slope of the tangent line to the curve $xy^3+xy=10$ at the point $(5,1)$.

The slope of the tangent line is _____, so an equation of the tangent line is

$y=$ _____ .

---

3. **(1 pt)pl/setDerivatives2_5Implicit/c2s6p2a.pg**

Use implicit differentiation to find the slope of the tangent line to the curve

$$-2x^2+2xy+4y^3=-48$$

at the point $(-4,-2)$.

$m=$ _____

---

4. **(1 pt)pl/setDerivatives2_5Implicit/c2s6p3.pg**

Find the slope of the tangent line to the curve $xy^3-2y-7.2=0$ at the point $(-0.4,-2)$.

$m=$ _____

---

5. **(1 pt)pl/setDerivatives2_5Implicit/c2s6p1.pg**

Find the slope of the tangent line to the curve

$$\sqrt{3x+4y}+\sqrt{xy}=\sqrt{23}+\sqrt{5}$$

at the point $(1,5)$.

$\left.\frac{dy}{dx}\right|_{(1,5)}=$ _____ .

---

6. **(1 pt)pl/setDerivatives2_5Implicit/s2_6_1a.pg**

The equation $3x^2-x+xy=3$ can be solved to obtain y as an explicit function of x. You do not need to find this explicit function $y(x)$ in this problem. Using the fact that $y(3)=-7$, find $y'(3)$ by implicit differentiation.

$y'(3)=$ _____ .

---

7. **(1 pt)pl/setDerivatives2_5Implicit/s2_6_14.pg**

Find y' by implicit differentiation. Match the expressions defining y implicitly with the letters labeling the expressions for y'.

___1. $2x\cos y+2\cos 2y=3\sin y$
___2. $2x\sin y+2\sin 2y=3\cos y$
___3. $2x\cos y+2\sin 2y=3\sin y$
___4. $2x\sin y+2\cos 2y=3\cos y$

A. $y'=\dfrac{2\sin y}{4\sin 2y-2x\cos y-3\sin y}$

B. $y'=\dfrac{2\cos y}{2x\sin y+4\sin 2y+3\cos y}$

C. $y'=-\dfrac{2\sin y}{2x\cos y+4\cos 2y+3\sin y}$

D. $y'=\dfrac{2\cos y}{2x\sin y-4\cos 2y+3\cos y}$

---

8. **(1 pt)pl/setDerivatives2_5Implicit/s2_6_25.pg**

Find the equation of the tangent line to the curve (a lemniscate) $2(x^2+y^2)^2=25(x^2-y^2)$ at the point $(3,-1)$. The equation of this tangent line can be written in the form $y=mx+b$ where m is: _____

and where b is: _____

---

9. **(1 pt)pl/setSwift/setDerivativesAbs_prob1.pg**

Let

$$f(x)=e^{-5|x|}.$$

Note the absolute value. Use abs(x) for the absolute value of x when entering your answer.

The derivative of f is $f'(x)=$ _____

---

10. **(1 pt)pl/setSwift/setDerivativesAbs_prob2.pg**

Let

$$y=|x^2+5x-5|.$$

Note the absolute value. Use abs(x) for the absolute value of x when entering your answer.

$y'=$ _____

professor Course: **NSieben_136H**

WeBWorK assignment number 18_sect_37 is due : 10/25/2007 at 02:00am MST.

1. **(1 pt)pl/setSwift/setTrig06Inverses_srw7_4_35.pg**
Find the exact value of each expression by sketching a triangle:
(a) $\cos(\arctan 2) =$ _____.
(b) $\tan(\arccos \frac{1}{\sqrt{5}}) =$ _____.

2. **(1 pt)pl/setSwift/setTrig06Inverses_srw7_6_1-8c.pg**
Evaluate the following expressions. Your answer must be in radians.
(a) $\arctan(1) =$ _____
(b) $\arctan(\sqrt{3}) =$ _____
(c) $\arctan(-\frac{\sqrt{3}}{3}) =$ _____

3. **(1 pt)pl/setDerivatives6InverseTrig/sc3_6_25.pg**
If $f(x) = 8\arcsin(x^3)$, find $f'(x)$.

_____

4. **(1 pt)pl/setSwift/setDerivatives6InverseTrig_sc3_6_27a.pg**
Let
$$f(x) = \arctan(3^x)$$
$f'(x) =$ _____

5. **(1 pt)pl/setDerivatives6InverseTrig/sc3_6_26.pg**
If $f(x) = 5x^4\arctan(8x^2)$, find $f'(x)$.
$f'(x) =$ _____ .

6. **(1 pt)pl/setDerivatives6InverseTrig/sc3_6_32.pg**
If $f(x) = 6\sin(3x)\arcsin(x)$, find $f'(x)$.
$f'(x) =$ _____ .

7. **(1 pt)pl/setDerivatives7Log/mec1.pg**
Let
$$f(x) = 3\ln(8x)$$
$f'(x) =$ _____
$f'(2) =$ _____

8. **(1 pt)pl/setDerivatives7Log/mec4.pg**
Let
$$f(x) = [\ln x]^2$$
$f'(x) =$ _____
$f'(e^2) =$ _____

9. **(1 pt)pl/setDerivatives7Log/mec3.pg**
Let
$$f(x) = -3x^4\ln x$$
$f'(x) =$ _____
$f'(e^2) =$ _____

10. **(1 pt)pl/setSwift/setDerivatives7Log_mec8.pg**
Let
$$f(x) = \ln\sqrt{\left|\frac{8x+6}{3x-4}\right|}$$
$f'(x) =$ _____
Hint: Simplify f first. It can be written as $f(x) = (\ln|p(x)| - \ln|q(x)|)/2$, where p and q are linear functions.

11. **(1 pt)pl/setSwift/setDerivatives7Log_mec6.pg**
Let
$$f(x) = \ln|x^7|$$
$f'(x) =$ _____
$f'(-e^5) =$ _____

12. **(1 pt)pl/setDerivatives7Log/ur_dr_7_2.pg**
If $f(x) = e^9 + \ln(5)$,
then $f'(x) =$ _____

13. **(1 pt)pl/setDervLogs/an4_3_42.pg**
Let $f(x) = 5^{x\tan(x)}$. Find $f'(x)$.
$f'(x) =$ _____

14. **(1 pt)pl/setDervLogs/an4_3_45.pg**
Let $f(x) = (\ln x)^{\sec x}$. Find $f'(x)$.
$f'(x) =$ _____

15. **(1 pt)pl/setDerivatives7Log/mec10b.pg**
Let
$$f(x) = \frac{x^2(x-7)^5}{(x^2+3)^5}$$
Use logarithmic differentiation to determine the derivative.
$f'(x) = \frac{x^2(x-7)^5}{(x^2+3)^5}\cdot$ (_____).

professor Course: **NSieben_136H**

WeBWorK assignment number 19_sect_38 is due : 10/26/2007 at 02:00am MST.

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1. **(1 pt)pl/setSwift/popGrowthRate.pg**

A population of bacteria grows exponentially, doubling every 55 minutes. When there are 10^6 bacteria, the population is growing at a rate of _____ bacteria per minute.

---

2. **(1 pt)pl/setSwift/differential1.pg**

If $f(x) = 4x^2 - 5x - 29$, then the differential of f is
$df = (\_\_\_\_\_) \cdot dx$

---

3. **(1 pt)pl/setSwift/differential2.pg**

If $u = \sqrt{3x+11}$, then the differential of u is
$du = (\_\_\_\_\_) \cdot dx$.

---

4. **(1 pt)pl/setSwift/setDerivatives9Approximations_s2_9_36.pg**

The linear approximation to $f(x) = \sin(9x)$ at $x = 0$ is $L(x) = A + Bx$ where $A =$ ____ and where $B =$ ____

---

5. **(1 pt)pl/setSwift/setDerivatives9Approximations_s2_9_19a.pg**

Use linear approximation, i.e. the tangent line, to approximate $\sqrt{49.2}$ as follows:
Let $f(x) = \sqrt{x}$. The equation of the tangent line to $f(x)$ at $x = 49$ can be written in the form $y = y_0 + m(x - 49)$ where $m =$ ____ and $y_0 =$ ____ .
Using this, we find our approximation: $\sqrt{49.2} \approx$ ____ .
NOTE: For this part use fractions to give the exact answer.
The relative error of this approximation is _____ per cent.

---

6. **(1 pt)pl/setSwift/setDerivatives9Approximations_s2_9_Y.pg**

Use linear approximation, i.e. the tangent line, to approximate 97^4 as follows:
Let $f(x) = x^4$. The equation of the tangent line to $f(x)$ at $x = 10^2$ is best written in the form $y = f(a) + f'(a) \cdot (x - a)$ where $a =$ ____, $f(a) =$ ____ , and $f'(a) =$ ____ .
Using this, we find our approximation: $97^4 \approx$ _____ .

---

7. **(1 pt)pl/setDerivatives9Approximations/s2_9_Aa.pg**

Use linear approximation, i.e. the tangent line, to approximate $\frac{1}{0.203}$ as follows: Let $f(x) = \frac{1}{x}$ and find the equation of the tangent line to $y = f(x)$ at a "nice" point near 0.203.
The "nice" point in this case is $x =$ ____, and the linear approximation gives $\frac{1}{0.203} \approx$ ____ .

---

8. **(1 pt)pl/setDerivatives9Approximations/ur_dr_9_1.pg**

Find the linear approximation of $f(x) = \ln x$ at $x = 1$ and use it to estimate $\ln 1.33$.
$L(x) =$ ____
$\ln 1.33 \approx$ ____

---

9. **(1 pt)pl/setDerivatives9Approximations/c2s9p8.pg**

Suppose that you can calculate the derivative of a function using the formula $f'(x) = 3f(x) + 2x$.
If $f(1) = 3$, use the linear approximation to estimate $f(1.009) \approx$ _____ .

---

10. **(1 pt)pl/setSwift/setDerivatives9Approximations_c2s9p7.pg**

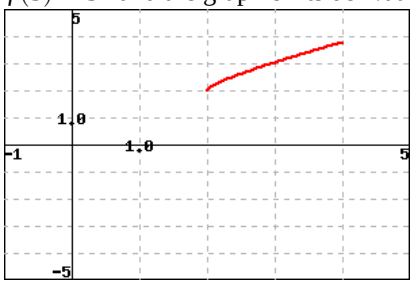
Use linear approximation to estimate the amount of paint needed to apply a coat of paint 0.07 cm thick to a hemispherical dome with a diameter of 50 meters.

The volume of paint needed is approximately _____ cubic centimenters.
Hint: The volume of a hemisphere of radius r is $V = f(r) = \frac{1}{2}\frac{4}{3}\pi r^3 = \frac{2}{3}\pi r^3$. The amount of paint needed is $f(r + \Delta r) - f(r)$.

---

11. **(1 pt)pl/setDerivatives9Approximations/nsc2s9p11.pg**

Suppose you have a function $f(x)$ and all you know is that $f(3) = 32$ and the graph of its derivative is:



Use linear approximation to get the estimate $f(3.2) \approx$ ____
Is your answer a little too big or a little too small? (Enter TB or TS): ____

---

12. **(1 pt)pl/setSwift/setDerivatives9Approximations_c2s9p10.pg**

Let $f(t)$ be the mass (in grams) at time t (in minutes) of a solid sitting in a beaker of water. Suppose that the solid dissolves in such a way that the rate of change (in grams/minute) of the mass of the solid at any time t can be determined from the mass using the formula:

$$f'(t) = -0.4f(t)(2 + f(t))$$

If there are 1 grams of solid at time $t = 2$ minutes, estimate the amount of solid 1 second later.
mass $\approx$ _____ .

---

professor Course: **NSieben_136H**

WeBWorK assignment number 20_sect_41 is due : 11/02/2007 at 02:00am MST.

1. **(1 pt)pl/setDerivatives8RelatedRates/s2_8_3.pg**

Let

$$xy = 3$$

and let

$$\frac{dy}{dt} = 3$$

Find $\frac{dx}{dt}$ when $x = 1$.

_____

2. **(1 pt)pl/setDerivatives8RelatedRates/s2_8_2.pg**

Let A be the area of a circle with radius r. If $\frac{dr}{dt} = 5$, find $\frac{dA}{dt}$ when $r = 3$. _____

3. **(1 pt)pl/setDerivatives8RelatedRates/s2_8_5.pg**

A spherical snowball is melting in such a way that its diameter is decreasing at rate of 0.1 cm/min. At what rate is the volume of the snowball decreasing when the diameter is 12 cm. (Note the answer is a positive number).

_____

4. **(1 pt)pl/setDerivatives8RelatedRates/SRM_c2s8p2.pg**

The altitude of a triangle is increasing at a rate of 2.500 centimeters/minute while the area of the triangle is increasing at a rate of 4.000 square centimeters/minute. At what rate is the base of the triangle changing when the altitude is 11.500 centimeters and the area is 89.000 square centimeters? _____

Note: The "altitude" is the "height" of the triangle in the formula "Area=(1/2)*base*height". Draw yourself a general "representative" triangle and label the base one variable and the altitude (height) another variable. Note that to solve this problem you don't need to know how big nor what shape the triangle really is.

5. **(1 pt)pl/setDerivatives8RelatedRates/s2_8_12.pg**

At noon, ship A is 30 nautical miles due west of ship B. Ship A is sailing west at 18 knots and ship B is sailing north at 18 knots. How fast (in knots) is the distance between the ships changing at 6 PM? (Note: 1 knot is a speed of 1 nautical mile per hour.)

_____

6. **(1 pt)pl/setDerivatives8RelatedRates/c2s8p5.pg**

A plane flying with a constant speed of 14 km/min passes over a ground radar station at an altitude of 14 km and climbs at an angle of 45 degrees. At what rate, in km/min is the distance from the plane to the radar station increasing 3 minutes later?

_____

7. **(1 pt)pl/setDerivatives8RelatedRates/SRM_c2s8p3.pg**

Water is leaking out of an inverted conical tank at a rate of 11700.0 cubic centimeters per min at the same time that water is being pumped into the tank at a constant rate. The tank has height 7.0 meters and the diameter at the top is 3.5 meters. If the water level is rising at a rate of 19.0 centimeters per minute when the height of the water is 1.0 meters, find the rate at which water is being pumped into the tank in cubic centimeters per minute. _____

Note: Let "R" be the unknown rate at which water is being pumped in. Then you know that if V is volume of water, $\frac{dV}{dt} = R - 11700.0$. Use geometry (similar triangles?) to find the relationship between the height of the water and the volume of the water at any given time. Recall that the volume of a cone with base radius r and height h is given by $\frac{1}{3}\pi r^2 h$.

8. **(1 pt)pl/setSwift/setDerivatives8RelatedRates_s2_8_21a.pg**

Gravel is being dumped from a conveyor belt at a rate of 50 cubic feet per minute. It forms a pile in the shape of a right circular cone whose base diameter and height are always the same. The height of the pile is increasing at a rate of _____ feet per minute when the pile is 11 feet high.

Recall that the volume of a right circular cone with height h and radius of the base r is given by

$$V = \frac{1}{3}\pi r^2 h$$

Note: See number 21 on pg 270 of the text for a picture of this.

1. **(1 pt)pl/setDerivatives10MaxMin/ur_dr_10_2.pg**
The function $f(x) = (6x-9)e^{5x}$ has one critical number. Find it.

____

2. **(1 pt)pl/setSwift/setDerivatives10MaxMin_s3_1_39.pg**
Consider the function $f(x) = 2x^2 - 10x + 3, \quad 0 \le x \le 10$. The global maximum value of $f(x)$ (on the given interval) is ____ and the global minimum value of $f(x)$ (on the given interval) is ____

3. **(1 pt)pl/setDerivatives10MaxMin/s3_1_43.pg**
The function $f(x) = -2x^3 + 33x^2 - 144x + 1$ has one local minimum and one local maximum.
This function has a local minimum at x equals ___ with value _____
and a local maximum at x equals ___ with value _____

4. **(1 pt)pl/setDerivatives10MaxMin/s3_3_6.pg**
Consider the function $f(x) = -2x^3 + 42x^2 - 240x + 6$. For this function there are three important intervals: $(-\infty, A]$, $[A, B]$, and $[B, \infty)$ where A and B are the critical numbers.
Find A ____
and B ____
For each of the following intervals, tell whether $f(x)$ is increasing (type in INC) or decreasing (type in DEC).
$(-\infty, A]$: ____
$[A, B]$: ____
$[B, \infty)$: ____

5. **(1 pt)pl/setDerivatives10MaxMin/s3_3_10.pg**
Consider the function $f(x) = 12x^5 + 75x^4 - 120x^3 + 6$. For this function there are four important intervals: $(-\infty, A]$, $[A, B]$,$[B, C]$, and $[C, \infty)$ where A, B, and C are the critical numbers.
Find A ____
and B ____
and C ____
At each critical number A, B, and C does $f(x)$ have a local min, a local max, or neither? Type in your answer as LMIN, LMAX, or NEITHER.
At A ____
At B ____
At C ____

6. **(1 pt)pl/setSwift/setDerivatives10MaxMinAbsVal.pg**
Consider the function $f(x) = |x^2 + x - 12|$. For this function there are four important intervals: $(-\infty, A]$, $[A, B]$,$[B, C]$, and $[C, \infty)$ where A, B, and C are the critical numbers.
Find A ____
and B ____
and C ____
At each critical number A, B, and C does $f(x)$ have a local min, a local max, or neither? Type in your answer as LMIN, LMAX, or NEITHER.
At A ____
At B ____
At C ____

7. **(1 pt)pl/setDerivatives10MaxMin/ur_dr_10_1.pg**
The function $f(x) = 3x + 7x^{-1}$ has one local minimum and one local maximum.
This function has a local maximum at $x =$ _____ with value _____
and a local minimum at $x =$ _____ with value _____

8. **(1 pt)pl/setSwift/setDerivatives10MaxMin_c3s3p1.pg**
The function
$$f(x) = 4x^3 + 6x^2 - 360x - 8$$
is decreasing on the interval [___ , ___].
It is increasing on the interval ($-\infty$, ___]
and the interval [___, ∞).
The function has a local maximum at ____.

9. **(1 pt)pl/setDerivatives10MaxMin/s3_3_3.pg**
Consider the function $f(x) = -4x^2 + 6x - 1$. $f(x)$ is increasing on the interval $(-\infty, A]$ and decreasing on the interval $[A, \infty)$ where A is the critical number.
Find A ____
At $x = A$, does $f(x)$ have a local min, a local max, or neither? Type in your answer as LMIN, LMAX, or NEITHER. ____

10. **(1 pt)pl/setSwift/setDerivatives10MaxMin_c3s4p1.pg**
Answer the following questions for the function
$$f(x) = x\sqrt{x^2 + 36}$$
defined on the interval $[-4, 5]$.

A. $f(x)$ is concave down on the interval ____ to ____
B. $f(x)$ is concave up on the interval ____ to ____
C. The inflection point for this function is at ____
D. The global minimum for this function occurs at ____
E. The global maximum for this function occurs at ____

11. **(1 pt)pl/setSwift/setDerivatives10MaxMin_c3s4p3a.pg**
Answer the following questions for the function
$$f(x) = \frac{x^3}{x^2 - 16}$$
with the domain $[-16, 20]$. It can be shown that
$$f''(x) = \frac{32x(48 + x^2)}{x^2 - 16}.$$
Enter points, such as inflection points in ascending order, i.e. smallest x values first. Enter intervals in ascending order also.
The function $f(x)$ has vertical asympototes $x =$ ____ and $x =$ ____.
$f(x)$ is concave up on the interval (____ , ____]

and on the interval (_____, _____].

The inflection point for this function is $(a, f(a))$, where $a =$ _____.

NOTE: A function must be continuous at an inflection point.

---

12. **(1 pt)pl/setDerivatives10MaxMin/osu_dr_10_1.pg**

Consider the function

$$f(x) = \frac{e^x}{4+e^x}$$

Then $f'(x)$ = _____

The following questions ask for endpoints of intervals of increase or decrease for the function $f(x)$.

Write INF for ∞, MINF for $-\infty$, and NA (ie. not applicable) if there are no intervals of that type.

The interval of increase for $f(x)$ is from _____

to _____

The interval of decrease for $f(x)$ is from _____

to _____

$f(x)$ has a local minimum at _____. (Put NA if none.)

$f(x)$ has a local maximum at _____. (Put NA if none.)

Then $f''(x)$ = _____

The following questions ask for endpoints of intervals of upward and downward concavity for the function $f(x)$.

Write INF for ∞, MINF for $-\infty$, and put NA if there are no intervals of that type.

The interval of upward concavity for $f(x)$ is from _____

to _____

The interval of downward concavity for $f(x)$ is from _____

to _____

$f(x)$ has a point of inflection at _____. (Put NA if none.)

---

13. **(1 pt)pl/setDerivatives10MaxMin/s3_4_6a.pg**

Consider the function $f(x) = 6x + 7x^{-1}$. For this function there are four important intervals: $(-\infty, A]$, $[A, B)$,$(B, C]$, and $[C, \infty)$ where A, and C are the critical numbers and the function is not defined at B.

Find A _____

and B _____

and C _____

For each of the following intervals, tell whether $f(x)$ is increasing (type in INC) or decreasing (type in DEC).

$(-\infty, A]$: _____

$[A, B)$: _____

$(B, C]$: _____

$[C, \infty)$ _____

Note that this function has no inflection points, but we can still consider its concavity. For each of the following intervals, tell whether $f(x)$ is concave up (type in CU) or concave down (type in CD).

$(-\infty, B)$: _____

(B, ∞): _____

---

14. **(1 pt)pl/setDerivatives12MVT/s3_2_11.pg**

Consider the function $f(x) = 1 - 4x^2$ on the interval $[-6, 6]$. The average, or mean, slope of the function on this interval is

$$\frac{f(6) - f(-6)}{6 - (-6)} = \text{\_\_\_\_\_}.$$

By the Mean Value Theorem, we know there exists a c in the open interval $(-6, 6)$ such that $f'(c)$ is equal to this mean slope. For this problem, there is only one c that works. Find it.

$c =$ _____

---

15. **(1 pt)pl/setDerivatives12MVT/s3_2_12.pg**

Consider the function $f(x) = 2x^3 - 6x^2 - 90x + 10$ on the interval $[-5, 7]$. The average or mean slope of the function on this interval is _____ .

By the Mean Value Theorem, we know there exists a c in the open interval $(-5, 7)$ such that $f'(c)$ is equal to this mean slope. For this problem, there are two values of c that work. The smaller one is c_1 = _____, and the larger one is c_2 = _____ .

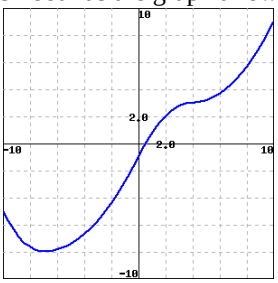
Note: You may have to use the quadratic formula for this problem.

---

16. **(1 pt)nauLibrary/setCalcI/func_anal_a.pg**

Function Analysis

The graph of the function f is given below. Assume that f is as smooth as the graph allows.



Fill in the function analysis table.

x		$x < -7$	$x = -7$	$-7 < x < 0$	$x = 0$	$0 < x < 4$	$x = 4$	$4 <$
f		?	?	?	?	?	?	?
		?		?		?		?
f'		?	?	?	?	?	?	?
		?		?		?		?
f''		?	?	?	?	?	?	?

professor Course: **NSieben_136H**

WeBWorK assignment number 22_sect_45 is due : 11/09/2007 at 02:00am MST.

---

1. **(1 pt)pl/setDerivatives21LHospital/osu_dr_21_20a.pg**

For each of the following forms determine whether the following limit type is indeterminate, always has a fixed finite value, or never has a fixed finite value. In the first case answer IND, in the second case enter the numerical value, and in the third case answer DNE. For example

The answer to $\frac{0}{0}$ is IND. This means

if $\lim_{x\to a} f(x) = 0$ and $\lim_{x\to a} g(x) = 0$, then $\lim_{x\to a} \frac{f(x)}{g(x)}$ is an indeterminate form of type $\frac{0}{0}$.

The answer to $\frac{0}{1}$ is 0. This means

if $\lim_{x\to a} f(x) = 0$ and $\lim_{x\to a} g(x) = 1$, then $\lim_{x\to a} \frac{f(x)}{g(x)} = 0$.

The answer to $\frac{1}{0}$ is DNE. This means

if $\lim_{x\to a} f(x) = 1$ and $\lim_{x\to a} g(x) = 0$, then $\lim_{x\to a} \frac{f(x)}{g(x)}$ does not exist.

Note that l'Hôpital's rule (in some form) may ONLY be applied to indeterminate forms.

___1. $\frac{1}{-\infty}$
___2. $1^{-\infty}$
___3. ∞^{∞}
___4. $1\cdot\infty$
___5. $0\cdot\infty$
___6. 0^0
___7. $\infty-\infty$
___8. 0^{∞}
___9. 1^{∞}
___10. $0^{-\infty}$
___11. $\infty\cdot\infty$
___12. ∞^1
___13. $\pi^{-\infty}$
___14. π^{∞}
___15. ∞^{-e}
___16. $\frac{\infty}{0}$
___17. $\frac{0}{\infty}$
___18. 1^0
___19. ∞^0
___20. $\infty^{-\infty}$

---

2. **(1 pt)pl/setDerivatives21LHospital/sc4_5_3.pg**

Evaluate the limit using l'Hôpital's rule.

$\lim_{x\to 0} \frac{e^x-1}{\sin(4x)} =$ _____ .

---

3. **(1 pt)pl/setDerivatives21LHospital/sc4_5_4a.pg**

Evaluate the limit using l'Hôpital's rule.

$\lim_{x\to 0} \frac{\sin(13x)}{\tan(11x)} =$ _____ .

---

4. **(1 pt)pl/setDerivatives21LHospital/sc4_5_8.pg**

Evaluate the limit using l'Hôpital's rule.

$\lim_{x\to 0} \frac{9^x-11^x}{x} =$ _____ .

---

5. **(1 pt)pl/setDerivatives21LHospital/sc4_5_23.pg**

Evaluate the limit using l'Hôpital's rule.

$\lim_{x\to\infty} 4xe^{1/x}-4x =$ _____ .

---

6. **(1 pt)pl/setDerivatives21LHospital/ur_dr_21_3.pg**

Evaluate the limit using l'Hôpital's rule.

$\lim_{x\to 0} \frac{e^x+3x-1}{5x} =$ _____ .

---

7. **(1 pt)pl/setDerivatives21LHospital/ur_dr_21_1.pg**

Evaluate the limit using l'Hôpital's rule.

$\lim_{x\to\infty} \frac{7x^2}{e^{9x}} =$ _____ .

---

8. **(1 pt)pl/setDerivatives21LHospital/osu_dr_21_1.pg**

Compute the following limits using l'Hôpital's rule if appropriate. Use INF to denote ∞ and MINF to denote $-\infty$.

$\lim_{x\to 1} \frac{2^x-2}{x^2-1} =$ _____ .

$\lim_{x\to\infty} \frac{\tan^{-1}(x)}{(1/x)-2} =$ _____ .

---

9. **(1 pt)pl/setDerivatives21LHospital/osu_dr_21_10.pg**

Compute the following limits using l'Hôpital's rule if appropriate. Use INF to denote ∞ and MINF to denote $-\infty$.

$\lim_{x\to\infty} \frac{\ln(x^4-9)}{\ln(x)\cos(1/x)} =$ _____ .

$\lim_{x\to\infty} \frac{e^{9x}}{e^{10x}-e^{-10x}} =$ _____ .

---

10. **(1 pt)pl/setDerivatives21LHospital/osu_dr_21_2.pg**

Compute the following limits using l'Hôpital's rule if appropriate. Use INF to denote ∞ and MINF to denote $-\infty$.

$\lim_{x\to 0} \frac{1-\cos(4x)}{1-\cos(3x)} =$ _____ .

$\lim_{x\to 1} \frac{4^x-3^x-1}{x^2-1} =$ _____ .

---

11. **(1 pt)pl/setDerivatives21LHospital/osu_dr_21_3.pg**

Compute the following limit using l'Hôpital's rule if appropriate. Use INF to denote ∞ and MINF to denote $-\infty$.

$\lim_{x\to\infty} \left(1-\frac{5}{x}\right)^x =$ _____ .

---

12. **(1 pt)pl/setDerivatives21LHospital/osu_dr_21_6.pg**

Find the following limits, using l'Hôpital's rule if appropriate.

$\lim_{x\to\infty} \frac{\arctan(x^3)}{x^4} =$ _____ .

$\lim_{x\to 0^+} \sqrt[4]{x}\ln(x) =$ _____ .

13. **(1 pt)pl/setDerivatives21LHospital/sc4_5_00-asympt.b.pg**

Use l'Hôpital's rule to find the horizontal asymptote of $y = \sqrt{x^2+4x+3} - x$. Its equation is $y =$ ___ .

14. **(1 pt)nauLibrary/setCalcI/lHospitalThrice.pg**

Evaluate the limit using repeated applications of l'Hôpital's rule.

$$\lim_{x\to 0} \frac{-2e^{-3x}+9x^2-6x+2}{9x^3} = \text{\_\_\_\_} .$$

professor Course: **NSieben_136H**

WeBWorK assignment number 23_sect_46 is due : 11/14/2007 at 02:00am MST.

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1. **(1 pt)pl/setDerivatives10_5Optim/c3s8p1.pg**

Find the point on the line $-2x+7y+3=0$ which is closest to the point $(3,2)$.

The closest point is (_____, _____).

---

2. **(1 pt)pl/setDerivatives10_5Optim/c3s8p2.pg**

A rectangle is inscribed with its base on the x-axis and its upper corners on the parabola $y=7-x^2$. What are the dimensions of such a rectangle with the greatest possible area?

Width = _____

Height = _____

---

3. **(1 pt)pl/setDerivatives10_5Optim/nsc4_6_16b.pg**

A fence 2 feet tall runs parallel to a tall building at a distance of 7 feet from the building. We want to find the the length of the shortest ladder that will reach from the ground over the fence to the wall of the building.

Here are some hints for finding a solution:

Let x be the angle that the ladder makes with the ground. Draw a picture of the ladder leaning against the wall of the building and just touching the top of the fence. The lenght of the ladder is the sum of two parts: the distance along the ladder from the ground to the top of the fence plus the distance along the ladder from the top of the fence to the wall.

Using these hints write a function $L(x)$ which gives the total length of a ladder which touches the ground at an angle x, touches the top of the fence and just reaches the wall.

$L(x)$ = _____ feet.

The length of the shortest ladder which will clear the fence is _____ feet.

---

4. **(1 pt)pl/setDerivatives10_5Optim/nsc4_6_3.pg**

If 1800 square centimeters of material is available to make a box with a square base and an open top, find the largest possible volume of the box.

Volume = _____ cubic centimeters.

---

5. **(1 pt)pl/setDerivatives10_5Optim/nsc4_7_16a.pg**

The manager of a large apartment complex knows from experience that 80 units will be occupied if the rent is 396 dollars per month. A market survey suggests that, on the average, one additional unit will remain vacant for each 3 dollar increase in rent. Similarly, one additional unit will be occupied for each 3 dollar decrease in rent. If the rent is set at x dollars, then _____ units will be rented out, and the total revenue for the apartment complex will be _____ dollars.

The manager should set the rent at _____ dollars to maximize revenue.

---

6. **(1 pt)pl/setDerivatives10_5Optim/s3_8_26a.pg**

A Norman window has the shape of a semicircle atop a rectangle so that the diameter of the semicircle is equal to the width of the rectangle. Due to building codes, the perimeter of the window must be 31 feet. If r is the radius of the semicircle, then the area of the window is _____ square feet. The largest posible Norman window with this perimeter has an area of _____ square feet.

---

7. **(1 pt)pl/setDerivatives10_5Optim/s3_8_6.pg**

A rancher wants to fence in an area of 500000 square feet in a rectangular field and then divide it in half with a fence down the middle parallel to one side. The shortest total length of fence that the rancher can use is _____ feet.

professor Course: **NSieben_136H**

WeBWorK assignment number 24_sect_48_49 is due : 11/19/2007 at 02:00am MST.

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1. **(1 pt)pl/setDerivatives11Newton/s2_10_3.pg**

Use Newton's method to approximate a root of the equation $x^3+x+2=0$ as follows.

Let $x_1=-1$ be the initial approximation.

The second approximation x_2 is _____

and the third approximation x_3 is _____

---

2. **(1 pt)pl/setDerivatives11Newton/s2_10_11a.pg**

Use Newton's method to approximate a root of the equation $16\sin(x)=x$ as follows.

Use the storage feature on your calculator, as described in class.

Let $x_1=1$ be the initial approximation.

The second approximation x_2 is _____

The third approximation x_3 is _____

The fourth approximation x_4 is _____

---

3. **(1 pt)nauLibrary/setCalcI/expLinNewt.pg**

Use Newton's method to approximate a solution of the equation $e^{-2x}=-2x+4$, starting with the initial guess indicated.

$x_1=-1$.

$x_2=$ _____ .

$x_3=$ _____ .

The solution to the equation found by Newton's method is $x=$ _____ .

---

4. **(1 pt)nauLibrary/setCalcI/antiderivatives_1.pg**

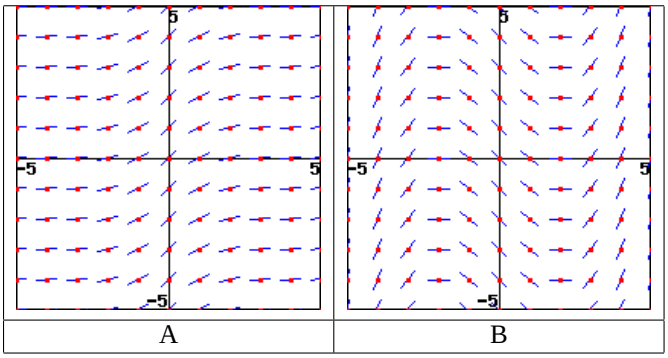
Match each of the following functions $f(x)$ with its slope field.

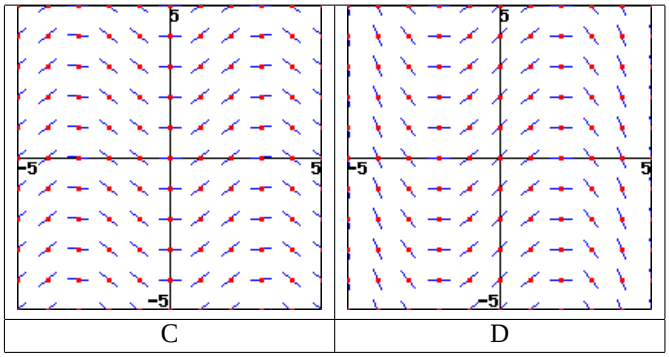
__1. $f(x)=(x^2-4)/4$

__2. $f(x)=\dfrac{1}{1+x^2}$

__3. $f(x)=\sin(x)$

__4. $f(x)=(4-x^2)/4$





---

5. **(1 pt)pl/setDerivatives20Antideriv/s3_10_2.pg**

Consider the function $f(x)=5x^3-9x^2+6x-9$.

An antiderivative of $f(x)$ is $F(x)=Ax^4+Bx^3+Cx^2+Dx$

where A is _____ and B is _____ and C is _____ and D is _____

---

6. **(1 pt)pl/setDerivatives20Antideriv/ur_dr_20_2a.pg**

Let $f(x)=\dfrac{-12}{\sqrt{1-x^2}}$. The general antiderivative of $f(x)$ is

$F(x)=$ _____ $+C$, where C is an arbitrary constant.

---

7. **(1 pt)pl/setDerivatives20Antideriv/c3s10p1fun.pg**

Given $f''(x)=-6x+4$, $f'(0)=3$, and $f(0)=2$, find $f'(x)$and $f(x)$.

$f'(x)=$ _____ .

$f(x)=$ _____ .

---

8. **(1 pt)pl/setDerivatives20Antideriv/s3_10_3.pg**

Consider the function $f(x)=4x^{10}+7x^5-3x^4-5$.

An antiderivative of $f(x)$ is $F(x)=Ax^n+Bx^m+Cx^p+Dx^q$

where

A is _____ and n is _____

and B is _____ and m is _____

and C is _____ and p is _____

and D is _____ and q is _____

---

9. **(1 pt)pl/setDerivatives20Antideriv/ur_dr_20_1.pg**

Let $f(x)=\dfrac{10}{x}-2e^x$.

Enter an antiderivative of $f(x)$

$F(x)=$ _____ .

---

10. **(1 pt)pl/setDerivatives20Antideriv/s3_10_8func.pg**

Consider the function $f(x)=\dfrac{5}{x^3}-\dfrac{7}{x^6}$.

Let $F(x)$ be the antiderivative of $f(x)$ with $F(1)=0$.

Then $F(x)=$ _____

---

11. **(1 pt)nauLibrary/setCalcI/antiExp.pg**

If $f'(x)=-9xe^{x^2}$ and $f(0)=-7$, then

$f(x)=$ _____ .

12. **(1 pt)pl/setDerivatives20Antideriv/c3s10p5a.pg**

Given $f''(x) = -16\sin(4x)$ and $f'(0) = -4$ and $f(0) = -5$, find $f(x)$.

$f(x) =$ _____ .

---

13. **(1 pt)pl/setDerivatives20Antideriv/c3s10p2.pg**

A car traveling at 42 ft/sec decelerates at a constant 6 feet per second squared. It travels ____ feet before coming to a complete stop.

---

14. **(1 pt)pl/setDerivatives20Antideriv/s3_10_56fun.pg**

A stone is thrown straight up from the edge of a roof, 35 feet above the ground, at a speed of 30 feet per second.

A. Ignoring air friction, and remembering that the acceleration due to gravity is -32 feet per second per second, the height of the stone after *t* seconds is _____ feet.

B. The stone hits the ground after _____ seconds. (You may need to use the quadratic formula.)

C. The velocity of the stone when it hits the ground is _____ feet per second.

---

professor Course: **NSieben_136H**

WeBWorK assignment number 25_sect_51_52 is due : 11/30/2007 at 02:00am MST.

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1. **(1 pt)nauLibrary/setCalcI/areaIntegralPos.pg**

You are given the four points in the plane $A=(6,7)$, $B=(11,2)$, $C=(15,8)$, and $D=(17,6)$. The graph of the function $f(x)$ consists of the three line segments *AB*, *BC* and *CD*. Find the integral $\int_6^{17} f(x)\,dx$ by interpreting the integral in terms of sums of areas of elementary figures.

$\int_6^{17} f(x)\,dx =$ _____ .

---

2. **(1 pt)pl/setIntegrals0Theory/sc5_2_24.pg**

Evaluate the integral below by interpreting it in terms of areas. In other words, draw a picture of the region the integral represents, and find the area using high school geometry.

$\int_{-7}^{7} \sqrt{49-x^2}dx =$ _____ .

---

3. **(1 pt)pl/setIntegrals0Theory/sc5_2_28.pg**

Evaluate the integral by interpreting it in terms of areas. In other words, draw a picture of the region the integral represents, and find the area using high school geometry.

$\int_0^{12} |4x-12|\,dx =$ _____ .

---

4. **(1 pt)pl/setIntegrals0Theory/osu_in_0_14a.pg**

You are given the four points in the plane $A=(-6,1)$, $B=(-1,0)$, $C=(3,-4)$, and $D=(8,-8)$. The graph of the function $f(x)$ consists of the three line segments *AB*, *BC* and *CD*. Find the integral $\int_{-6}^{8} f(x)\,dx$ by interpreting the integral in terms of sums and/or differences of areas of elementary figures.

$\int_{-6}^{8} f(x)\,dx =$ _____ .

---

5. **(1 pt)pl/setIntegrals0Theory/ur_in_0_2.pg**

Evaluate the definite integral by interpreting it in terms of areas.

$\int_3^8 (4x-20)dx$ _____.

---

6. **(1 pt)pl/setIntegrals0Theory/sc5_2_3.pg**

Consider the integral

$$\int_1^7 (2x^2+2x+1)\,dx$$

(a) Find the Riemann sum for this integral using right endpoints and $n=3$.

$R_3 =$ _____ .

(b) Find the Riemann sum for this same integral, using left endpoints and $n=3$.

$L_3 =$ _____ .

---

7. **(1 pt)pl/setIntegrals0Theory/sc5_2_2a.pg**

Use the Midpoint Rule to approximate

$$\int_{-0.5}^{4.5} x^3 dx$$

with $n=5$.

$M_5 =$ _____ .

---

8. **(1 pt)pl/setIntegrals0Theory/sc5_2_5.pg**

Use the Midpoint Rule to approximate the integral

$$\int_{-10}^{8} (10x+5x^2)dx$$

with $n=3$.

$M_3 =$ _____.

---

9. **(1 pt)pl/setIntegrals0Theory/sc5_2_30.pg**

$$\int_8^{11} f(x)\,dx - \int_8^{10} f(x)\,dx = \int_a^b f(x)\,dx$$

where $a =$ _____ and $b =$ _____

---

10. **(1 pt)pl/setIntegrals0Theory/ur_in_0_13.pg**

Let $\int_9^{12} f(x)dx = 4$, $\int_9^{10} f(x)dx = 2$, and $\int_{11}^{12} f(x)dx = 5$. Then

$\int_{10}^{11} f(x)dx =$ _____ and $\int_{11}^{10} (4f(x)-2)dx =$ _____ .

---

11. **(1 pt)pl/setIntegrals0Theory/ur_in_0_3.pg**

Given that $1 \le f(x) \le 2$ for $-5 \le x \le 1$, use a comparison property of the integral to estimate the value of $\int_{-5}^{1} f(x)dx$

_____ $\le \int_{-5}^{1} f(x)dx \le$ _____

---

12. **(1 pt)pl/setIntegrals0Theory/ur_in_0_12.pg**

In this problem you will calculate $\int_0^4 \left(\frac{x^2}{4}-3\right) dx$ by using the definition

$$\int_a^b f(x)\,dx = \lim_{n\to\infty} \left[\sum_{i=1}^{n} f(x_i)\Delta x\right]$$

The summation inside the brackets is R_n which is the Riemann sum where the sample points are chosen to be the right-hand endpoints of each sub-interval.

Calculate R_n for $f(x)=\frac{x^2}{4}-3$ on the interval $[0,4]$ and write your answer as a function of n without any summation signs. You will need the summation formulas in your textbook

$R_n =$ _____ .

$\int_0^4 \left(\frac{x^2}{4}-3\right) dx = \lim_{n\to\infty} R_n =$ _____ .

professor Course: **NSieben_136H**

WeBWorK assignment number 26_sect_53 is due : 12/03/2007 at 02:00am MST.

1. **(1 pt)pl/setIntegrals3Definite/s4_4_17.pg**
Evaluate the definite integral

$$\int_3^8 (2x+10)dx = \_\_\_\_\_ .$$

2. **(1 pt)pl/setIntegrals3Definite/c4s4p6t.pg**
Find the value of the definite integral.

$$\int_2^8 \frac{1}{t^2}dt = \_\_\_\_\_ .$$

3. **(1 pt)pl/setIntegrals3Definite/osu_in_3_2.pg**
Evaluate the definite integral.

$$\int_4^6 \frac{6}{\sqrt{x}}dx = \_\_\_\_\_ .$$

4. **(1 pt)pl/setCalculusFundamentalTheorem/6-5-10.pg**
Evaluate the definite integral:

$$\int_8^{16} dx = \_\_\_ .$$

5. **(1 pt)pl/setCalculusFundamentalTheorem/6-5-20.pg**
Evaluate the definite integral.

$$\int_1^6 \frac{4}{x}dx = \_\_\_\_\_ .$$

6. **(1 pt)pl/setCalculusFundamentalTheorem/6-5-20_b.pg**
Evaluate the definite integral.

$$\int_{-7}^{-9} \frac{-8}{x}dx = \_\_\_\_\_$$

7. **(1 pt)pl/setIntegrals2Indefinite/ur_in_2_1cen.pg**
Evaluate the indefinite integral:

$$\int \left(\frac{9}{x^7}+\frac{4}{5x}\right)dx = \_\_\_\_\_ +C.$$

8. **(1 pt)pl/setIntegrals2Indefinite/ur_in_2_2a.pg**
Evaluate the indefinite integral:

$$\int 9e^{6x}dx = \_\_\_\_ +C.$$

9. **(1 pt)nauLibrary/setCalcI/simple_int.pg**
Evaluate the indefinite integral.

$$\int \left(3\sin(t)-2\cos(t)+7\sec^2(t)-4e^t+\frac{6}{\sqrt{1-t^2}}+\frac{4}{1+t^2}\right)dt = \_\_\_\_\_ +C.$$

10. **(1 pt)nauLibrary/setCalcI/int_upper_limit_x_lin.pg**
Evaluate the definite integral. Your answer will be a function of x.

$$\int_1^x (6t-5)dt = \_\_\_\_\_ .$$

11. **(1 pt)pl/setIntegrals3Definite/osu_in_3_6.pg**
Consider the function

$$f(x) = \begin{cases} x & \text{if } x < 1 \\ \frac{1}{x} & \text{if } x \geq 1 \end{cases}$$

Evaluate the definite integral.

$$\int_0^6 f(x)\,dx = \_\_\_\_\_ .$$

12. **(1 pt)pl/setIntegrals3Definite/s4_4_41.pg**
Evaluate the definite integral. Evaluate any trig. functions in your answer.

$$\int_0^{\pi} 2\sin(x)dx = \_\_\_\_ .$$

13. **(1 pt)pl/setIntegrals3Definite/osu_in_3_3.pg**
Evaluate the integral.

$$\int_4^6 \frac{4x^2+1}{x^2}\,dx = \_\_\_\_\_ .$$

Note that there is no quotient rule for antiderivatives. Simplify the integrand before integrating.

14. **(1 pt)pl/setIntegrals3Definite/s4_4_21u.pg**
Evaluate the definite integral.

$$\int_{-4}^4 (16-u^2)du = \_\_\_\_ .$$

15. **(1 pt)pl/setIntegrals3Definite/sc5_3_26a.pg**
Evaluate the integral.

$$\int_{-0.1}^{0.3} \frac{dx}{\sqrt{1-x^2}} = \_\_\_\_\_ .$$

16. **(1 pt)pl/setIntegrals3Definite/ur_in_3_1.pg**
The velocity function is $v(t) = -t^2+6t-8$ for a particle moving along a line. Find the displacement and the distance traveled by the particle during the time interval [-3,5].

displacement = _____

distance traveled = _____

17. **(1 pt)nauLibrary/setCalcI/totalChange_1.pg**
An oil tanker breaks apart and starts leaking. As time goes on, the rate at which the oil is leaking out will diminish. Suppose that t hours after the tanker breaks apart, the oil is leaking out at a rate of $R(t) = \frac{0.4}{1+t^2}$ million gallons per minute. Then _____ million gallons of oil will leak out in the first 10 hours after the shipwreck.

professor Course: **NSieben_136H**

WeBWorK assignment number 27_sect_54 is due : 12/05/2007 at 02:00am MST.

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1. **(1 pt)pl/setIntegrals4FTC/osu_in_4_14.pg**

Evaluate the definite integral using the Fundamental Theorem of Calculus.

$\int_5^8 \left(\frac{d}{dt}\sqrt{4+4t^4}\right) dt =$ _____

---

2. **(1 pt)pl/setIntegrals4FTC/c4s4p1.pg**

If $f(x) = \int_2^x t^8 dt$

then

$f'(x) =$ _____

$f'(3) =$ _____

---

3. **(1 pt)pl/setIntegrals4FTC/c4s4p1a.pg**

If $f(x) = \int_0^x (t^3+4t^2+4)\,dt$

then

$f''(x) =$ _____

---

4. **(1 pt)pl/setIntegrals4FTC/c4s4p2B.pg**

If $f(x) = \int_x^{12} t^3 dt$

then

$f'(x) =$ _____

---

5. **(1 pt)pl/setIntegrals4FTC/c4s4p4c.pg**

If $f(x) = \int_x^{x^2} t^5 dt$

then

$f(x) =$ _____

$f'(x) =$ _____

---

6. **(1 pt)pl/setIntegrals4FTC/sc5_4_13.pg**

Use part I of the Fundamental Theorem of Calculus to find the derivative of

$$f(x) = \int_5^x \frac{1}{1+t^3} dt$$

$f'(x) =$ _____

---

7. **(1 pt)pl/setIntegrals4FTC/c4s4p7.pg**

Given

$$f(x) = \int_0^x \frac{t^2-1}{1+\cos^2(t)} dt$$

At what value of x does the local max of $f(x)$ occur?

$x =$ _____

---

8. **(1 pt)pl/setIntegrals4FTC/osu_in_4_17a.pg**

The following limit is an indeterminate form of type 0/0. Evaluate the limit using L'Hospital's rule.

$\lim_{x\to 0} \frac{x}{\int_0^x \sqrt[3]{125-2t^3}\,dt} =$ _____

---

9. **(1 pt)pl/setIntegrals4FTC/sc5_4_18b.pg**

If

$$h(x) = \int_{-2}^{\sin(x)} (\cos(t^3)+t)\,dt$$

then $h'(x) =$_____ .

Hint: Define

$$f(x) = \int_{-2}^{x} (\cos(t^3)+t)\,dt$$

Then $h(x) = f(\sin(x))$. Use the chain rule to compute $h'(x)$.

---

10. **(1 pt)pl/setIntegrals4FTC/ur_in_4_12a.pg**

Let

$$f(x) = \begin{cases} 0 & \text{if} \quad x < -5 \\ 4 & \text{if} \quad -5 \le x < 1 \\ -5 & \text{if} \quad 1 \le x < 4 \\ 0 & \text{if} \quad x \ge 4 \end{cases}$$

and

$$g(x) = \int_{-5}^{x} f(t) dt$$

Determine the value of each of the following:

(a) $g(-6) =$ ___

(b) $g(-4) =$ ___

(c) $g(2) =$ ___

(d) $g(5) =$ ___

(e) The global maximum of g occurs at $x =$ ___ and the global maximum value of g is ___ .

It may be helpful to make a graph of f when answering these questions.

---

1. **(1 pt)pl/setIntegrals14Substitution/sc5_5_1.pg**

Evaluate the integral.

$$\int x^5(x^6-3)^{11}dx = \_\_\_\_\_ + C.$$

Hints: Make the substitution $u = x^6 - 3$. Your answer should be in terms of x, not u.

---

2. **(1 pt)pl/setIntegrals14Substitution/sc5_5_26.pg**

Evaluate the indefinite integral:

$\int 6e^{6x}\sin(e^{6x})\,dx =$ _____ + C.

---

3. **(1 pt)pl/setIntegrals14Substitution/mec_int2.pg**

Evaluate the indefinite integral.

$\int \frac{(\arcsin x)^9}{\sqrt{1-x^2}}dx =$ _____ + C.

---

4. **(1 pt)pl/setIntegrals14Substitution/sc5_5_29.pg**

Evaluate the indefinite integral.

$\int \frac{x+2}{x^2+4x}\,dx =$ _____ + C.

---

5. **(1 pt)pl/setIntegrals14Substitution/osu_in_14_8a.pg**

Find the following indefinite integrals.

$\int \frac{x}{\sqrt{x+5}}\,dx =$ _____ $+C$

---

6. **(1 pt)pl/setIntegrals14Substitution/sc5_5_20.pg**

Evaluate the indefinite integral.

$$\int \frac{\cos x}{7\sin x+14}\,dx = \_\_\_\_\_ + C.$$

---

7. **(1 pt)pl/setIntegrals14Substitution/osu_in_14_9.pg**

$\int \sqrt[7]{e^x}\,dx =$ _____ $+ C$

---

8. **(1 pt)pl/setIntegrals14Substitution/mec_int3.pg**

Evaluate the indefinite integral.

$\int \frac{e^{3x}}{e^{6x}+49}dx =$ _____ + C.

---

9. **(1 pt)pl/setIntegrals14Substitution/osu_in_14_5a.pg**

Consider the definite integral $\int_{\pi/6}^{\pi/2} \frac{\cos(x)}{\sin^8(x)}\,dx$

Then the most appropriate substitution to simplify this integral is

$u =$ _____

Then $du = f(x)\,dx$ where

$f(x) =$ _____

After making the substitution and simplifying we find that $\int_{\pi/6}^{\pi/2} \frac{\cos(x)}{\sin^8(x)}\,dx = \int_a^b g(u)\,du$ where

$g(u) =$ _____

$a =$ _____

$b =$ _____

This definite integral has value = _____

---

10. **(1 pt)pl/setIntegrals14Substitution/sc5_5_49.pg**

Evaluate the definite integral.

$$\int_0^2 \frac{dx}{x+7} = \_\_\_\_\_ .$$

---

11. **(1 pt)pl/setIntegrals14Substitution/sc5_5_44.pg**

Evaluate the definite integral.

$$\int_0^{\pi/3} \sin(3t)dt = \_\_\_ .$$

---

12. **(1 pt)pl/setIntegrals14Substitution/osu_in_14_6a.pg**

Calculate the following definite integral.

$\int_0^1 x^2\sqrt{9x+6}\,dx =$ _____ .

---

13. **(1 pt)pl/setIntegrals14Substitution/sc5_5_51.pg**

Evaluate the definite integral.

$$\int_1^{e^7} \frac{dx}{x\sqrt{\ln x}} = \_\_\_\_\_ .$$

---

14. **(1 pt)nauLibrary/setCalcI/totalChange_2.pg**

An oil tanker breaks apart and starts leaking. Suppose that right after the shipwreck, the oil is leaking out at a rate of 0.5 million gallons per minute, and that the rate decays exponentially with a half-life of 90 minutes. Then, t minutes after the shipwreck the oil is leaking at a rate of $R(t) =$_____ million gallons per minute, and _____ million gallons of oil will leak out in the first 330 minutes after the shipwreck.