examples

Nandor Sieben

10/30/2021

Homework:

1. Create a personal account on cocalc.com

2. Create a pdf file containing the output of the commands below.

3. Identify the automorphism group of the simple graph with vertex set $V = \{a, b, c, d, e, f\}$ and edge set $E = \{ac, bc, cd, de, df\}$.

%md
This is a markdown cell. It allows LaTeX formulas like $\sum_{i=1}^{10} a_i$.

Add your name here: ?????

%latex
This is a \LaTeX cell. Let $a$ be the $\int_0^1 x^2 \, dx$.

%r
# This is an R cell.
y<-seq(1, 20, by = 2)
print(y)
print(fivenum(y))

%gap
# This is GAP cell. GAP is computer algebra system for abstract algebra.
G:= Group( (1,2), (1,2,3) );
Print( StructureDescription(G), 
Print( el, 
Print( ords:=List(el, Order);
Print( ords, 
Sort(ords);
Print( ords, 
Print(IsAbelian(G));
%sh
date
ls

# This is a default sage cell.
p=plot(x * sin(1/x), (x, -2, 2))
p.save('figure.pdf')
show(p)

# Find derivative and antiderivative
f(t)=t^2
diff(t)
diff(f(x),x)
integrate(f(x),x)

# Work with matrices
v=vector([1, 2, 3])
A=matrix([2, 3, [1, 2, 3, 4, 5, 6]])
B=matrix([[1, 2, 3], [4, 5, 6]])
A*v
view(A*B.transpose())

# More matrices.
A=matrix([3, 2, [1, 2, 2, 4, 3, 6]])
view(A)
view(A.rref())
A.right_kernel().basis()

# Working with subspaces
V=QQ^3
x=vector(QQ,[1, 2, 3])
y=vector(QQ,[3, 4, 5])
z=vector(QQ,[5, 6, 6])
W = V.span([x, y])
2*x in W
z in W

# Gram-Schmidt orthogonalization
A=matrix([2, 3, [1, 2, 3, 4, 5, 6]])
O,L=A.gram_schmidt()
O

# basic loop
for i in range(1,4):
    print(i)

# testing
for i in range(10):
if is_prime(i):
    print(i)

# list comprehension
primes=[i for i in range(10) if is_prime(i)]
print(primes)

# defining lambda functions
f = lambda a, b: a + b
g = lambda a : a**2
f(1,2)
g(3)
lambda a : a**2(4)

# defining more complicated functions
def f(a, b=0):
    return a + b
f(3)
f(3,2)

# Finding the automorphism group of a graph.
g=Graph([(1,2),(1,3),(2,3),(3,5),(3,6)])
# show(g)
g.plot()
aut=g.automorphism_group()
aut.multiplication_table()
aut.structure_description()
# lt=latex(g)
# lt
# latex.eval(str(lt))

# Now work on problem 3.