HW 4 - MAT661

due: Friday 2/3/06.

(1) Solve $y' - 2y = 3e^t$ using integrating factors. Compare existence and uniqueness with the linear theorem and give the maximum interval of existence.

(2) Solve $y' + \frac{4}{t}y = t^{-3}e^{-t}$, $y(-1) = 0$, $t < 0$ using integrating factors. Compare existence and uniqueness with the linear theorem and give the maximum interval of existence.

(3) Solve $y' = y^{\frac{1}{3}}$ using separation of variables. Be sure to consider the equillibrium solution. Solve the corresponding IVP when $y(0) = 0$. Is there a unique solution? Compare existence and uniqueness with the nonlinear theorem.

(4) Solve the constant coefficient second order linear IVP $y'' + \gamma y' + y = 0$, $y(0) = 0$, $y'(0) = 1$, where $\gamma \geq 0$ is a parameter.