

HOMEWORK 2**DUE: THURSDAY, JUNE 1**

1. In each of the following problems determine if the equation is linear or non-linear and separable or non-separable and solve the IVP with the given initial conditions

a) $y' + 2y = xe^{-x}$, $y(0) = 2$

b) $y' = \frac{3x^2}{3y^2 - 4}$, $y(1) = 0$

c) $xy' + 2y = 2$, $y(0) = y_0$

d) $y' = \frac{x^2}{y(1 + x^3)}$, $y(0) = 1$

e) $y' = x^2 + x^2y^2$, $y(0) = 1$

2. Solve the two IVPs and determine their intervals of definition

a) $\frac{dy}{dt} = y^2$, $y(0) = 1$

b) $y - y' = t$, $y(0) = 1$

3. Solve the two IVPs and find the coordinates of the first critical point (i.e. local max or min) of each of the solutions for $t > 0$.

a) $y' - y = 2 \cos t$, $y(0) = -1$

b) $y' = 2 \frac{\cos 2t}{(3 + 2y)}$, $y(0) = -1$ *

*Hint for 3b): For finding the critical point, use the DE itself. Do not differentiate the answer again.