MA 331 **Name (Print):** _____
Fall 2017
Homework 1: Separable Diff Eq
Due: 08/29/17

1.) What is the order of the following differential equations?

a.) $4y' + 3y = y'' - \sin(y)$

b.) $e^{y'''} - 3y'' = 0$

c.) $\left(\frac{dy}{dx}\right)^4 - 2y\frac{d^3y}{dx^3} = 4$

2.) An enzyme is produced by one reaction at a rate $b(t) = 6 - 0.008t^2$ and is cleared at a rate $d(t) = 2 + 0.002t^2$, where t is measured in minutes and the rates have unites mg/L/min.

a.) How much total enzyme is produced in the first 10 minutes from reaction 1?

b.) How much total enzyme is degraded in the first 10 minutes from reaction 2?

c.) What was the total net increase/decrease in the amount of enzyme in the first 10 minutes?

d.) Assuming an initial presence of enzyme of 100mg/L, write down the initial value problem describing the total amount of enzyme present, $E(t)$, at time t.

e.) Solve the initial value problem you created in part d.)

f.) At what time is the concentration of enzyme greatest?

3.) Solve the following differential equations

a.) $y' = \frac{x^2}{y(1+x^3)}$

b.) $\frac{dy}{dx} = \frac{x-e^{-x}}{y+e^y}$

4.) Solve the following initial value problems

a.) $y' = (1-2t)y^2, \quad y(0) = -\frac{1}{6}$

b.) $\sin(2r) + \cos(3y)\frac{dy}{dr} = 0, \quad y\left(\frac{\pi}{2}\right) = \frac{\pi}{3}$