Math 2414 **Graded Homework 2 (Section 9.3)** **Spring 2015**

Instructions:

1) **Due: Friday, March 6, 2015, during the first 10 minutes of class.**
2) **Assignments must be submitted in a blue book – no exceptions. Bluebooks are available at the on campus/off campus bookstore, student union, etc.**
3) **On the front cover, write the following at the top:**
   a) **TA name**
   b) **Your name**
   c) **Assignment name**
   d) **Problem session number**
4) **Write no more than one problem per page.**
5) **Solutions must be presented neatly, completely, and with logical flow.**
6) **15% will be deducted for assignments turned in after the first 10 minutes of class.**
7) **25% will be deducted for assignments which are not neat and orderly.**
8) **15% will be deducted for assignments without your TA's name.**
9) **Assignments will not be accepted after class.**

1. Find the general solution of the DE. Write your solution explicitly.

$$y' = \left(y^2 + y^2 \cos x\right)^2$$

2. Solve the initial value problem. Write your solution explicitly.

$$\frac{du}{dt} = tu - t + u - 1$$
$$u(0) = 2$$

3. Find the general solution for the differential equation. Leave your solution in implicit form.

$$(y^2 e^x - e^x)y' = x^2$$

4. Find the general solution for the differential equation. Leave your solution in implicit form.

$$\frac{dx}{dt} = (2 - x)\sqrt{1 - x}$$

5. Consider the initial value problem

$$\frac{dy}{dx} = y^2 - 5y + 6$$
$$y(0) = 1$$

where y represents the population of a species (in thousands), and x represents time (in years).

a) Solve this initial value problem to find the population as a function of time. Write your solution explicitly.

b) What number does the population approach in the long term? (i.e., find an equilibrium solution by computing $\lim_{x \to \infty} y(x)$)

c) What number does the population approach if one could, theoretically, go back in time? (i.e., find an equilibrium solution by computing $\lim_{x \to -\infty} y(x)$)