Math 129 – Calculus II **Homework #8**

Due Monday Dec 5

To receive credit, you must show all work, and your work must be easy to read.

1. Determine whether $y = 7x^4$ is a solution to the differential equation

$$x\frac{dy}{dx} = 4y.$$

using the indicated techniques.

   (a) Using the techniques of §11.1.

   (b) Using separation of variables to find the general solution and showing that is is a solution of that form.

2. Find the general solution to the differential equation

$$\frac{dy}{dx} = e^y \cos(x).$$

3. A hot metal bar is submerged in a large reservoir of water whose temperature is 60 degrees fahrenheit. The temperature of the bar 20 seconds after submersion is 100 degrees. After a minute, the temperature has cooled to 80 degrees. What is the formula for $F(t)$, the temperature of the bar after t seconds? (Set up and solve a differential equation.)

4. Caffeine is metabolized and excreted at a continuous rate of about 17% per hour. A person with no caffeine in the body starts drinking coffee, containing 130 mg of caffeine per cup, at 7 am. The person drinks coffee continuously all day at the rate of one cup an hour. Write a differential equation for A, the amount of caffeine in the body t hours after 7 am and give the particular solution to this differential equation. How much caffeine is in the person's body at 5 pm?

5. Write out solutions to 5 questions from the practice exam. (To be successful on the final, you should try to do ALL the questions on the practice final). For Piazza posts, post a solution to a question of your choice, as long as no one else has posted it yet. Label your solution with the letter you were assigned so the referees know the right one to referee.