Math 240 - Homework 1

Name _____

Score _____

The following problems are from the suggested homework. Show all work to receive full credit. Supply explanations when necessary. This assignment is due September 14.

1. (2 points) Solve the initial value problem.

$$\frac{dy}{dx} = 3x^2(y^2 + 1), \quad y(0) = 1$$

2. (2 points) A pitcher of buttermilk initially at $25°$C is to be cooled by setting it on the front porch, where the temperature is $0°$C. Suppose that the temperature of the buttermilk has dropped to $15°$C after $20\,$min. When will it be at $5°$C? (Use Newton's Law of Cooling.)

Turn over.

3. (3 points) Solve the differential equation: $xy' + (2x - 3)y = 4x^4$.

4. (3 points) A 400-gal tank initially contains 100 gal of brine containing 50 lb of salt. Brine containing 1 lb of salt per gallon enters the tank at the rate of 5 gal/s, and the well-mixed brine in the tank flows out at the rate of 3 gal/s. How much salt will the tank contain when it is full of brine?