Differential Equations Test #1

SUMMER 2016

Pat Rossi Name _____

Instructions. Show clearly how you arrive at your answers.

1. Classify the following according to **order** and **linearity.**

   (a) $y^{(4)} - xy'' - 5x^2y' + 6y = e^x$

   (b) $y' = \frac{x}{y}$

   (c) $\frac{d^2s}{dt^2} = -9s^2$

   (d) $3y'' - y' - 10xy = 10$

2. Solve: $\frac{dy}{dx} = -xy; \quad y = 5$ when $x = 0$

3. Show that the function $y = c_1 e^{-2x} + c_2 e^{3x} + x$ is a solution of the differential equation $y'' - y' - 6y = -6x - 1$.

4. Solve: $\frac{dy}{dx} - y = x^2 y \quad y(0) = 1$. (Assume that $x, y > 0$)

5. Solve: $\frac{1}{x}y' + 2y = x^2 + \frac{1}{x}$

6. Show that the equation is exact, and solve: $(6x - 3y)\,dx + (4y - 3x)\,dy = 0$

7. Solve: $y' = \frac{x-y}{x+y}$ Solve, using the substitution $v = \frac{y}{x}$