

Differential Equations Practice Test #1A

SPRING 2004

Pat Rossi

Name _____

Instructions. Answers follow this section. Solutions follow the answers.

1. Solve: $\frac{dy}{dx} = \frac{x}{y}$; $y(0) = 16$

2. Solve: $xy' = 3x+2y$; $y(1) = 1$ (Solve as "Linear First Order" ($y' + P(x)y = Q(x)$) AND by Substitution, $v = (\frac{y}{x})$.)

3. Solve: $\frac{dy}{dx} - x^2 + 3x = 0$

4. Solve: $\frac{dy}{dx} = -\frac{x+y}{x}$; Show that this is an exact differential equation, and solve accordingly.

5. Show that $y = A_1 \cos(3x) + B_1 \sin(3x)$ is a solution of the differential equation $y'' + 9y = 0$.

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

(a) $y'' + y' = x$

(b) $y'' + y = x^2$

(c) $\frac{dy}{dx} = \frac{x}{1+y^2}$

(d) $\frac{dy}{dx} = \frac{y^2}{x^2}$

(e) $y^{(4)} - y''' + xyy' = 0$

(f) $y^{(4)} - y''' + x^2y' = x^4 - 3$

7. Solve: $\frac{dI}{dt} + 5I = 10$; $I(0) = 0$

8. Solve: $y' + \frac{y}{x} = 1$ (assume that $x > 0$)