

Name \_\_\_\_\_

1. For each of the following differential equations, find the particular solution that satisfies the given initial condition:

a)  $y' = xe^x$ ;  $y(1) = 3$

b)  $y' = 2 \sin x \cos x$ ;  $y(0) = 1$

2. Use the method of separation of variables to solve each of the following:

a)  $x^5 y' - y^{-5} = 0$

b)  $y' = 4xy$

3. Find the general solution of each of the following first order, linear ordinary differential equations:

a)  $y' - xy = 0$

b)  $y' + 2xy = 2x$

4. Verify that the following equations are exact and then solve:

a)  $\left(x + \frac{2}{y}\right)dy + ydx = 0$

b)  $(\sin x \tan y + 1)dx - \cos x \sec^2 y dy = 0$

5. Solve the following by performing the appropriate substitutions:

a)  $xy' = y + 2xe^{-\frac{y}{x}}$

b)  $\frac{dy}{dx} - \frac{3}{x}y = x^4 y^{\frac{1}{3}}$

6. Solve the following:

a)  $12yx^2 dx + 12x^3 dy = 0$

- b) An item at an unknown temperature is placed in a room which is held at a constant temperature of  $30^\circ\text{F}$ . If after 10 min, the temperature of the item is  $0^\circ\text{F}$  and after 20 min the temperature of the item is  $15^\circ\text{F}$ , how long would it take for the temperature to reach  $20^\circ\text{F}$ ?