Calculus Worksheet

Solve First Order Differential Equations (1)

Answers:

1. Find the general solution for: \( y^2 \frac{dy}{dx} = (1 - x)dx \)

   *Variables separable.* Answer: \( y^3 = 3x - \frac{3}{2}x^2 + 3C \)

2. Find the particular solution for: \( y' \sin(2y) - \cos x = 0, x = \frac{\pi}{2} \) when \( y = 0 \)

   *Variables separable.* Answer: \( \cos 2y = -2\sin x + 3 \)

3. Find the general solution for: \( y = (3y^3 + x) \frac{dy}{dx} \)

   *Exact Differential Equation.* Answer: \( \frac{x}{y} - \frac{3}{2}y^2 = C \)

4. Find the particular solution for: \( 3x^2 y' = 5x - 6xy, \ x = 2 \) when \( y = 1 \)

   *Exact Differential Equation.* Answer: \( y = \frac{2}{3x^2} + \frac{5}{6} \)

5. Find the particular solution for: \( 2e^{2x} - y = xy', \ x = 1 \) when \( y = 6 \)

   *Exact Differential Equation.* Answer: \( y = \frac{e^{2x} - 1.39}{x} \)

6. Find the general solution for: \( \frac{dy}{dx} - 5x = xy \)

   *First Order Linear Differential Equation.* Answer: \( y = -5 + Ce^{\frac{x^2}{2}} \)

7. Find the particular solution for: \( xy' - \frac{3}{x} = 2y, x = 2 \) when \( y = 5 \)

   *First Order Linear Differential Equation.* Answer: \( y = -\frac{1}{x} + \frac{11}{8}x^2 \)