Class 12 Mathematics · Chapter 9: Differential Equations

Worksheet · 20 marks · about 40 minutes · based on NCERT

Name _____ Class and section _____ Date _____

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1. If $y = x^m$, $x > 0$, is a solution of $x^2 y'' - 2x y' - 4y = 0$ and $m > 0$, then m equals [1]

(a) 1 (b) 4
(c) 2 (d) 3

2. The general solution of $\frac{dy}{dx} = x e^{-y}$ is [1]

(a) $y = x^2 e^y + C$ (b) $e^{-y} = \frac{x^2}{2} + C$
(c) $e^y = x^2 + C$ (d) $e^y = \frac{x^2}{2} + C$

3. The sum of the order and the degree of $(\frac{d^3y}{dx^3})^2 - 4(\frac{d^2y}{dx^2})^5 + y = 0$ is [1]

(a) 7 (b) 8
(c) 5 (d) 4

4. For which of the following differential equations is the degree not defined? [1]

(a) $y'' + \cos y = 0$ (b) $y' + e^{y'} = x$
(c) $(y')^2 = \sin x$ (d) $y''' + y y' = 0$

5. The degree of the differential equation $(y'')^2 + (y')^3 - 7y = 0$ is [1]

(a) 1 (b) 3
(c) 2 (d) 5

6. Find the order and the degree of the differential equation $[1 + (\frac{dy}{dx})^2]^{3/2} = 5\frac{d^2y}{dx^2}$. [2]

7. Find the integrating factor of $\cos x \frac{dy}{dx} + y \sin x = 1$, $0 < x < \frac{\pi}{2}$, and hence its general solution. [2]

8. A colony of bacteria grows at a rate proportional to the number N present, and it trebles in 4 hours. [2] Write the differential equation for N and show that $N(t + 4) = 3N(t)$ for every t, so the trebling time does not depend on the number at the start.

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9. Find the general solution of $\frac{dy}{dx} + 4y = 8x$. [3]

10. Find the particular solution of $(1 + x^2)\frac{dy}{dx} = xy$, $y > 0$, given that $y = 2$ when $x = 0$. [3]

11. Solve $x\frac{dy}{dx} - 3y = x^4 \cos x$, $x > 0$. [3]

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