

Calculus Practice: Differential Equations 3a

For each problem, find the particular solution of the differential equation that satisfies the initial condition.

$$1) \frac{dy}{dx} = \frac{2e^x}{y^2}, y(-1) = \frac{\sqrt[3]{3e^3 + 6e^2}}{e}$$

$$A) \frac{y^3}{3} = 3e^x + 1$$

$$y = \sqrt[3]{9e^x + 3}$$

$$B) \frac{y^3}{3} = 2e^x + \frac{1}{3}$$

$$y = \sqrt[3]{6e^x + 1}$$

$$C) \frac{y^3}{3} = e^x + \frac{1}{3}$$

$$y = \sqrt[3]{3e^x + 1}$$

$$D) \frac{y^3}{3} = 2e^x + 1$$

$$y = \sqrt[3]{6e^x + 3}$$

$$2) \frac{dy}{dx} = \frac{2x}{y^2}, y(2) = \sqrt[3]{14}$$

$$A) \frac{y^3}{3} = x^2 + \frac{2}{3}$$

$$y = \sqrt[3]{3x^2 + 2}$$

$$B) \frac{y^3}{3} = \frac{x^2}{2} + \frac{1}{3}$$

$$y = \sqrt[3]{\frac{3x^2}{2} + 1}$$

$$C) \frac{y^3}{3} = \frac{x^2}{2} + \frac{2}{3}$$

$$y = \sqrt[3]{\frac{3x^2}{2} + 2}$$

$$D) \frac{y^3}{3} = \frac{x^2}{2} + 1$$

$$y = \sqrt[3]{\frac{3x^2}{2} + 3}$$

$$3) \frac{dy}{dx} = \frac{2x^3}{y^2}, y(0) = \sqrt[3]{3}$$

$$A) \frac{y^3}{3} = \frac{x^4}{4} + \frac{1}{3}$$

$$y = \sqrt[3]{\frac{3x^4}{4} + 1}$$

$$B) \frac{y^3}{3} = \frac{x^4}{2} + \frac{2}{3}$$

$$y = \sqrt[3]{\frac{3x^4}{2} + 2}$$

$$C) \frac{y^3}{3} = \frac{x^4}{2} + 1$$

$$y = \sqrt[3]{\frac{3x^4}{2} + 3}$$

$$D) \frac{y^3}{3} = \frac{x^4}{4} + \frac{2}{3}$$

$$y = \sqrt[3]{\frac{3x^4}{4} + 2}$$

$$4) \frac{dy}{dx} = e^{x-y}, y(-2) = \ln \frac{e^2 + 1}{e^2}$$

$$A) e^y = e^x + 1$$

$$y = \ln(e^x + 1)$$

$$B) e^y = 3e^x + 3$$

$$y = \ln(3e^x + 3)$$

$$C) e^y = e^x + 2$$

$$y = \ln(e^x + 2)$$

$$D) e^y = 2e^x + 3$$

$$y = \ln(2e^x + 3)$$

$$5) \frac{dy}{dx} = 2x\sqrt{y}, y(1) = \frac{9}{4}$$

$$A) 2\sqrt{y} = \frac{3x^2}{2} + 2$$

$$y = \left(\frac{3x^2}{4} + 1\right)^2$$

$$B) 2\sqrt{y} = x^2 + 2$$

$$y = \left(\frac{x^2}{2} + 1\right)^2$$

$$C) 2\sqrt{y} = \frac{x^2}{2} + 2$$

$$y = \left(\frac{x^2}{4} + 1\right)^2$$

$$D) \frac{e^{2y}}{2} = x^2 + \frac{3}{2}$$

$$y = \frac{\ln(2x^2 + 3)}{2}$$

$$7) \frac{dy}{dx} = -2y - 1, y(1) = \frac{-e^2 + 2}{2e^2}$$

$$A) \ln|y| = 2x^2$$

$$y = e^{2x^2}$$

$$B) -\frac{\ln|-2y + 3|}{2} = x + \frac{-4 - \ln 3}{2}$$

$$y = \frac{3e^{2x} + 3}{2e^{2x}}$$

$$C) -\frac{\ln|-2y - 1|}{2} = x + \frac{-2 - \ln 2}{2}$$

$$y = \frac{-e^{2x} + 2}{2e^{2x}}$$

$$D) -\ln|-y - 1| = x - \ln 3 - 1$$

$$y = \frac{-e^x - 3}{e^x}$$

$$9) \frac{dy}{dx} = 6x^2y, y(-3) = -\frac{3}{e^{54}}$$

$$A) \ln|y| = 2x^3 + \ln 2 + 54$$

$$y = 2e^{2x^3}$$

$$B) \ln|y| = 2x^3 + \ln 2 + 2$$

$$y = -2e^{2x^3}$$

$$C) \ln|y| = x^3$$

$$y = -e^{x^3}$$

$$D) \ln|y| = 2x^3 + \ln 3 + 54$$

$$y = -3e^{2x^3}$$

$$6) \frac{dy}{dx} = y - 3, y(-2) = \frac{3e^2 - 2}{e^2}$$

$$A) \frac{y^2}{2} = \frac{3x^2}{2} + \frac{1}{2}$$

$$y = \sqrt{3x^2 + 1}$$

$$B) \frac{\ln|2y + 3|}{2} = x + \frac{2 + \ln 2}{2}$$

$$y = \frac{2e^{2x} - 3}{2}$$

$$C) \ln|y - 3| = x + \ln 2 + 2$$

$$y = -2e^x + 3$$

$$D) \frac{\ln|2y + 1|}{2} = x + \frac{\ln 2}{2}$$

$$y = \frac{-2e^{2x} - 1}{2}$$

$$8) \frac{dy}{dx} = yx^2 + yx, y(0) = -2$$

$$A) \ln|y| = \frac{x^3}{3} + \frac{x^2}{2} + \ln 2$$

$$y = -2e^{\frac{x^3}{3} + \frac{x^2}{2}}$$

$$B) \ln|y| = \ln(x^2 + 2)$$

$$y = -(x^2 + 2)$$

$$C) \ln|y| = x^2 + \frac{x^3}{3}$$

$$y = -e^{x^2 + \frac{x^3}{3}}$$

$$D) \ln|y| = \frac{x^3}{3} + \frac{x^2}{2}$$

$$y = e^{\frac{x^3}{3} + \frac{x^2}{2}}$$

$$10) \frac{dy}{dx} = 4x^3y, y(1) = -e$$

$$A) \ln|y| = x^4$$

$$y = -e^{x^4}$$

$$B) \ln|y| = 2x^4 + \ln 2$$

$$y = -2e^{2x^4}$$

$$C) \ln|y| = 2x^3 + \ln 2 + 16$$

$$y = 2e^{2x^3}$$

$$D) \ln|y| = x^4$$

$$y = e^{x^4}$$

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