

1. Find $\frac{dy}{dx}$ of the following:

(a) $y = 5^x \cos 2x$ (b) $y = \frac{3^x}{x^2}$ (c) $y = 3^x \ln 5x$

2. Differentiate the following expressions with respect to x :

(a) $\frac{1}{3}e^{9x} - 2e^3$ (b) $(e^{1-x})^2$ (c) $e^{-x} \cos 2x$ (d) $\frac{e^x}{1 + e^{2x}}$

3. Differentiate the following expressions with respect to x :

(a) $\ln[(x+1)(x-3)]$ (b) $\ln(\sin x + \cos x)$ (c) $\ln(1 + e^x)$ (d) $\ln(\sqrt{x^2 + 1} - x)$

4. Find $\frac{dy}{dx}$ of the following:

(a) $y = e^{3x + \sin x}$ (b) $y = \ln(1 + \sqrt{x})$ (c) $y = \frac{e^{2x}}{x+1}$ (d) $y = \ln^3 \sqrt{\frac{x+2}{2-x}}$

5. Find the coordinates of the point where the curve $y = \ln(x^2 - 3)$ crosses the positive x -axis and find the equation of the normal to the curve at this point.

6. Find the coordinates of the point where the curve $y = e^{\sqrt{x}-2}$ cuts the line $y = 1$ and show that the tangent to the curve at this point passes through the origin.

7. Two variables x and y are related by $e^y = 3x^2 - 2$. At the instant when $x = 1$, x is increasing at a rate of 3 units/s. Find the rate of change of y .