Answer on Question #70262 – Math – Calculus

Question

implicit differentiation

Find $\frac{dy}{dx}$ for:

a) $e^{cosx} + e^{siny} = \frac{1}{4}$

b) $e^{2x} + 3y = x^2 - ln(xy^3)$

Solution

a) $e^{cosx} + e^{siny} = \frac{1}{4}$

$$e^{\cos x} \cdot (-\sin x) + e^{\sin y} \cos y \cdot \frac{dy}{dx} = 0$$

$$\frac{dy}{dx} = \frac{\sin x \cdot e^{cosx}}{\cos y \cdot e^{\sin y}}$$

Answer: $\frac{dy}{dx} = \frac{\sin x \cdot e^{cosx}}{\cos y \cdot e^{\sin y}}$

Solution

b) $e^{2x} + 3y = x^2 - ln(xy^3)$

$$2e^{2x} + 3\frac{dy}{dx} = 2x - \frac{y^3 + 3y^2\frac{dy}{dx} \cdot x}{xy^3}$$

$$\left(3 + \frac{3}{y}\right)\frac{dy}{dx} = 2x - 2e^{2x} - \frac{1}{x}$$

$$\frac{dy}{dx} = \left(2x - 2e^{2x} - \frac{1}{x}\right)\frac{y}{3(y+1)}$$

$$\frac{dy}{dx} = \frac{xy(2x - 2e^{2x}) - y}{3xy + 3x}$$

Answer:
$$\frac{dy}{dx} = \frac{xy(2x - 2e^{2x}) - y}{3xy + 3x}$$