

$$f(x) = e^{2y} \cdot f'(x) = 2e^{2y}$$

$$f(g(x))g'(x) = f'(x)g(x) + g'(x)f(x)$$

$$\frac{d}{dx} f(g(x)) = f'(g(x)) \cdot g'(x)$$

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Worksheet 15

Exercise 1. Find the partial derivatives $\frac{\partial h}{\partial x}$ and h_y given $h(x, y) = x^2 e^{xy}$.

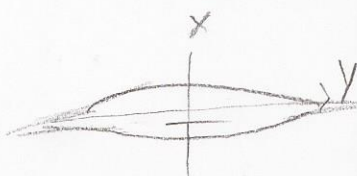
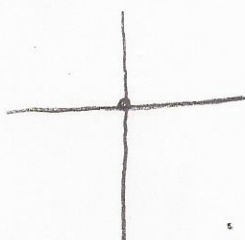
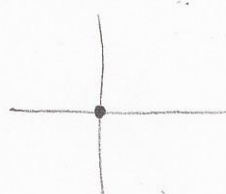
$$\frac{\partial h}{\partial x} = x^2 e^{xy} = 2x e^{xy} + x^2 y e^{xy}$$

$$h'_y = x^2 e^{xy} = x^3 e^{xy}$$

$x, y, z = 0$

$x \geq y = 0$

$z, y, x = 0$



$z = 16$

Exercise 2. Find the second partial derivatives f_{xx} , f_{xy} , $\frac{\partial^2 f}{\partial y^2}$, and $\frac{\partial^2 f}{\partial x \partial y}$ for $f(x, y) = 3x^4 - 2xy + 5xy^3$.

$$f_{xx} \rightarrow 3x^4 - 2xy + 5xy^3 \frac{d}{dx} = 12x^3 - 2y + 5y^3 \frac{d}{dx} = 36x^2 = f_{xx}$$

$$f_{xy} \rightarrow 3x^4 - 2xy + 5xy^3 \frac{d}{dx} = 12x^3 - 2y + 5y^3 \frac{d}{dy} = -2 + 15y^2 = f_{xy}$$

$$\frac{\partial^2 f}{\partial y^2} \rightarrow 3x^4 - 2xy + 5xy^3 \frac{d}{dy} = -2x + 15xy^2 \frac{d}{dy} = 30xy = \frac{\partial^2 f}{\partial y^2}$$

$$\frac{\partial^2 f}{\partial x \partial y} \rightarrow 3x^4 - 2xy + 5xy^3 \frac{d}{dy} = -2x + 15xy^2 \frac{d}{dx} = 2 + 15y^2 = \frac{\partial^2 f}{\partial x \partial y}$$