

Quiz

$$1. \int_2^3 (\ln x)^2 dx$$

$$u = (\ln x)^2$$

$$du = 2 \ln x \cdot \frac{1}{x} dx$$

$$dv = dx$$

$$v = x$$

$$= x(\ln x)^2 \Big|_2^3 - 2 \int_2^3 \ln x dx$$

$$u = \ln x$$

$$du = \frac{1}{x} dx$$

$$dv = dx$$

$$v = x$$

$$= 3(\ln 3)^2 - 2(\ln 2)^2 - 2 \left(x \ln x \Big|_2^3 - \int_2^3 dx \right)$$

$$= 3(\ln 3)^2 - 2(\ln 2)^2 - 2 \left(3 \ln 3 - 2 \ln 2 - x \Big|_2^3 \right)$$

$$= 3(\ln 3)^2 - 2(\ln 2)^2 - 6 \ln 3 + 4 \ln 2 + 2$$

$$2. f(x, y) = \ln(3x^2 + 4y^2)$$

$$f_x(x, y) = \frac{6x}{3x^2 + 4y^2}$$

$$f_y(x, y) = \frac{8y}{3x^2 + 4y^2}$$

$$f_{xx}(x, y) = \frac{6(3x^2 + 4y^2) - 6x(6x)}{(3x^2 + 4y^2)^2}$$

$$= \frac{6(-3x^2 + 4y^2)}{(3x^2 + 4y^2)^2}$$

$$f_{yy}(x, y) = \frac{8(3x^2 + 4y^2) - 8y \cdot 8y}{(3x^2 + 4y^2)^2}$$

$$= \frac{8(3x^2 - 4y^2)}{(3x^2 + 4y^2)^2}$$

$$f_{xy}(x, y) = \frac{-48xy}{(3x^2 + 4y^2)^2} \checkmark$$

$$f_{yx} = \frac{-48xy}{(3x^2 + 4y^2)^2} \checkmark$$