

$$13 \quad z = f(x, y) = -4x^3 - 6y^2 + 3xy$$

$$\frac{\partial z}{\partial x} = -12x^2 + 3y$$

$$\frac{\partial z}{\partial y} = -12y + 3x$$

$$f_x(4, 0) = -12 \cdot 4^2 + 3 \cdot 0 = -12 \cdot 16 = \textcircled{-192}$$

$$f_y(4, 0) = -12 \cdot 0 + 3 \cdot 4 = \textcircled{12}$$

$$14 \quad z = f(x, y) = \ln|9x^4 + 5x^2y^2|$$

$$f_x(x, y) = \frac{1}{9x^4 + 5x^2y^2} \cdot \frac{\partial}{\partial x} (9x^4 + 5x^2y^2)$$

$$= \frac{1}{9x^4 + 5x^2y^2} \cdot (36x^3 + 10xy^2)$$

$$f_y(x, y) = \frac{1}{9x^4 + 5x^2y^2} \cdot \frac{\partial}{\partial y} (9x^4 + 5x^2y^2)$$

$$= \frac{1}{9x^4 + 5x^2y^2} \cdot (10x^2y)$$

$$f_x(2, -1) = \frac{1}{9 \cdot (2)^4 + 5(2)^2(-1)^2} \cdot (36 \cdot 2^3 + 10 \cdot 2 \cdot (-1)^2)$$

$$= \frac{1}{144 + 20} \cdot (288 + 20) = \textcircled{\frac{308}{164}}$$

$$f_y(-4, 3) = \frac{1}{9(-4)^4 + 5(-4)^2 \cdot 3^2} \cdot (10(-4)^2 \cdot 3)$$

$$= \frac{1}{2304 + 720} \cdot 480 = \textcircled{\frac{480}{3024}}$$