

$$2.1 \quad Z = x + \sin(x^2 y) + \ln y$$

$$\frac{\partial Z}{\partial x} = 1 + \cos(x^2 y) \cdot 2xy$$

$$\frac{\partial^2 Z}{\partial x^2} = (-\sin(x^2 y)(2xy) \cdot 2xy + \cos(x^2 y) \cdot 2y)$$

$$= -4x^2 y^2 \sin(x^2 y) + 2y \cos(x^2 y)$$

$$= 2y [\cos(x^2 y) - 2x^2 y \sin(x^2 y)]$$

$$\frac{\partial Z}{\partial y} = \cos(x^2 y) \cdot x^2 + \frac{1}{y}$$

$$\frac{\partial^2 Z}{\partial y^2} = -x^2 \sin(x^2 y) x^2 - y^{-2}$$

$$= -x^4 \sin(x^2 y) - \frac{1}{y^2}$$