

Exercise 1:

$$1, f(x, y, z) = xyz - z^2 - y^2$$

$$x: \frac{\partial}{\partial x}(xyz) + \frac{\partial}{\partial x}(-z^2) + \frac{\partial}{\partial x}(-y^2)$$

$$= yz$$

$$y: \frac{\partial}{\partial y}(xyz) + \frac{\partial}{\partial y}(-z^2) + \frac{\partial}{\partial y}(-y^2)$$

$$= mxz - 2y$$

$$z: \frac{\partial}{\partial z}(xyz) + \frac{\partial}{\partial z}(-z^2) + \frac{\partial}{\partial z}(-y^2)$$

$$= xy - 2z$$

$$2, f(x, y, z) = e^{x+y} - \log(z)$$

$$x: \frac{\partial}{\partial x}(e^{x+y}) + \frac{\partial}{\partial x}(-\log(z))$$

$$= e^{x+y}$$

$$y: \frac{\partial}{\partial y}(e^{x+y}) + \frac{\partial}{\partial y}(-\log(z))$$

$$= e^{x+y}$$

$$z: \frac{\partial}{\partial z}(e^{x+y}) + \frac{\partial}{\partial z}(-\log(z))$$

$$= -\frac{1}{z}$$

Exercise 2:

$$1, \text{Dimensions of: } \begin{cases} \dim(\vec{x}) = 3 \\ \dim(\vec{y}) = 4 \\ \dim(\vec{z}) = 3 \end{cases}$$

$$2, \text{Value of } \begin{cases} x_1 = -2.0 \\ y_2 = 10 \\ y_0 = 2 \\ z_0 = 3 \end{cases}$$

$$3, \text{Compute } \begin{cases} \vec{x} + \vec{y} : \text{dimension mismatch} \\ \vec{x} + 0.5 \times \vec{y} : \text{dimension still mismatch, illegal to compute} \\ \vec{y} + \vec{z} : \text{dimension mismatch, illegal to compute} \end{cases}$$