

Exercise 1:

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

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

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

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

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

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

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