Homework 4

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CSEN 5350 Application of Neural Networks

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Problem Computational Graph. Draw a computational graph of this equation: $f(x, y, z) = xy + z^3 + x$ and its partial derivatives with respect to x, y, and z at $x = -1$, $y = 2$, $z = 3$.

$$\frac{\partial f}{\partial x} = \frac{\partial f}{\partial d} + \frac{\partial a}{\partial x} = 3 \qquad \frac{\partial f}{\partial y} = \frac{\partial f}{\partial c} \frac{\partial c}{\partial a} \frac{\partial a}{\partial y} = -1 \qquad \frac{\partial f}{\partial z} = \frac{\partial f}{\partial c} \frac{\partial c}{\partial b} \frac{\partial b}{\partial z} = 27$$

Left graph:
$x = -1$, $y = 2$, $z = 3$
$*$, $()^3$
$a = xy = -2$, $b = z^3 = 27$
$d = x = -1$
$+$
$c = xy + z^3 = 25$
$+$
$f(x, y, z) = xy + z^3 + x = 24$
output

Right graph:
$x = -1$, $y = 2$, $z = 3$
$\frac{\partial a}{\partial x} = y = 2$, $\frac{\partial a}{\partial y} = x = -1$, $\frac{\partial b}{\partial z} = 3z^2 = 27$
$*$, $()^3$
$\frac{\partial c}{\partial a} = 1$, $\frac{\partial c}{\partial b} = 1$
$\frac{\partial f}{\partial d} = 1$
$+$
$\frac{\partial f}{\partial c} = 1$
$+$
$f(x, y, z) = xy + z^3 + x = 24$
output