CSE-5368 Neural Networks
Exercise Problems 06

- Consider the expression:

$$f(x, y, z) = max(x^2 y, z) + \text{xz}$$

Draw the computational graph for this expression and compute the numerical values of the partial derivatives with respect to x, y, and z given the inputs:

$$x = 2, \quad y = 3, \quad z = 5$$

$\dfrac{\delta f(x, y, z)}{\delta x} =$	$\dfrac{\delta f(x, y, z)}{\delta y} =$	$\dfrac{\delta f(x, y, z)}{\delta z} =$

- Consider the expression:

$$f(x, y) = \frac{1}{xy} + [\max(x, y))]^2$$

Draw the computational graph for this expression and compute the partial derivatives with respect to x and y given the inputs:

$$x = -2, \quad y = 3$$

- Consider the expression:
$$f(x) = [10 - \max(x, y * (q + z))]^2$$

Draw the computational graph for this expression and compute the partial derivatives with respect to x, y, q, and z via backpropagation given the input:
$$x = 1, \quad y = 2, \quad q = -1, \quad z = 5$$

- Consider the expression:

$$f(x, y, z) = min(xy, z) + xz$$

Use the computational graph for this expression to compute the numerical values of the partial derivatives with respect to x, y, and z given the inputs:

$$x = 2, \quad y = 7, \quad z = 20$$

$\dfrac{\delta f(x, y, z)}{\delta x} =$	$\dfrac{\delta f(x, y, z)}{\delta y} =$	$\dfrac{\delta f(x, y, z)}{\delta z} =$

- Consider the expression:

$$f(x, y) = \frac{1}{xy} + [\max(x, y))]^2$$

Draw the computational graph for this expression and compute the partial derivatives with respect to x and y given the inputs:

$$x = -2, \quad y = 3$$

- Consider the expression: $f(x) = \frac{(x+y)}{y} * [min(y, z)]^2$

Given the inputs $\qquad x = 2, \qquad y = 4, \qquad z = -3$

Draw the computational graph.

Calculate the $\frac{\delta f(x,y,z)}{\delta x}$ and $\frac{\delta f(x,y,z)}{\delta y}$ and $\frac{\delta f(x,y,z)}{\delta z}$ and show all the numerical values of the backward pass.

Show all the numerical values as they flow in the forward and backward path.

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1. Consider the expression: $f(x) = \frac{(x-y)}{y} + (x * y)$

Given the inputs $\quad x = 25, \quad y = 5$

Draw the computational graph.

Calculate the $\frac{\delta f(x,y)}{\delta x}$ *and* $\frac{\delta f(x,y)}{\delta y}$

Show all the numerical values as they flow in the forward and backward path.