

HW 2

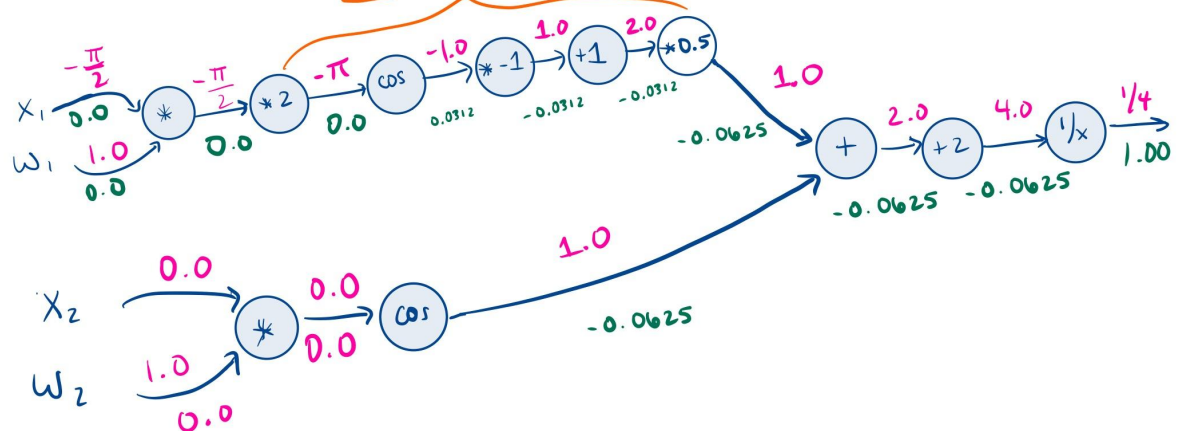
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Problem 1:

A.

1A) $f(x, w) = \frac{1}{2 + \sin^2(x_1 w_1) + \cos(x_2 w_2)}$ Calculate $\frac{df}{dx_i}$ and $\frac{df}{dw_i}$

$$\sin^2(x, w_1) = \frac{1 - \cos(2x, w_1)}{2}$$



B. See hw2_1.py in .zip file.

```
(dl) PS C:\Users\rahim\Documents\Code\DeepLearning> & conda run -n dl
--no-capture-output --live-stream python c:/Users/rahim/Documents/Code
/DeepLearning/HW2/hw2_1.py
x1 Backprop Result: tensor([-5.4639e-09])
w1 Backprop Result: tensor([8.5827e-09])
x2 Backprop Result: tensor([0.])
w2 Backprop Result: tensor([0.])
(dl) PS C:\Users\rahim\Documents\Code\DeepLearning> █
```

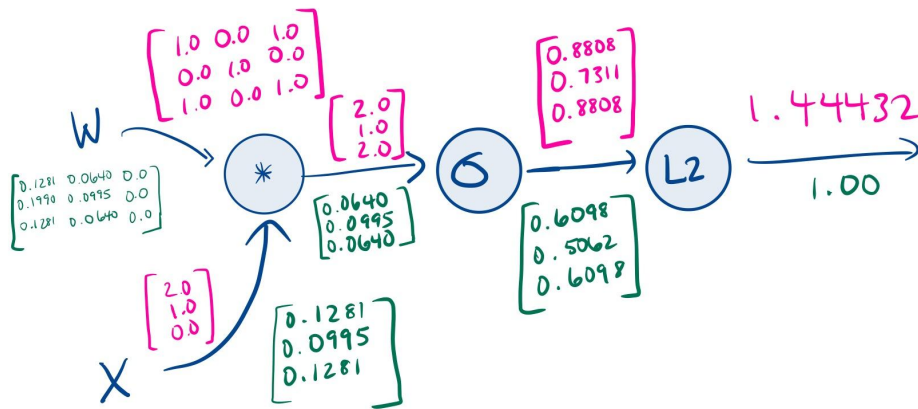
(Final values in the code are slightly off because of pi approximation)

If you want to see more gradients, you can print the `.grad` of each variable.

Problem 2:

A.

2A) $f(x, w) = ||\sigma(Wx)||^2$ Calculate $\frac{\partial f}{\partial x_i}$ and $\frac{\partial f}{\partial W_{i,j}}$



B. See hw2_2.py in .zip file.

```
(dl) PS C:\Users\rahim\Documents\Code\DeepLearning> & conda run -n dl
--no-capture-output --live-stream python c:/Users/rahim/Documents/Code
/DeepLearning/HW2/hw2_2.py
W Backprop Result: tensor([[0.1281, 0.0640, 0.0000],
[0.1990, 0.0995, 0.0000],
[0.1281, 0.0640, 0.0000]], dtype=torch.float64)
x Backprop Result: tensor([[0.1281],
[0.0995],
[0.1281]], dtype=torch.float64)
(dl) PS C:\Users\rahim\Documents\Code\DeepLearning> □
```

If you want to see more gradients, you can print the .grad of each variable.