Quiz 1

Consider the following code snippet.

```
z = torch.matmul(w,x) + b

y = z * z

y.backward()
```

Question 1

1.0/1.0 point (graded)

Let x, w are rank-one tensors of same dimension and b is rank-zero tensor. Required grad for w is true, and x is false. Consider the code snippet given above. Then the value of w.grad is equal to?

- 2 * (torch.matmul(w,x) + b)
- 2 * (x + b)
- 2 * (torch.matmul(w,x) + b) * x ✔
- 2 * (w * x + b) * x

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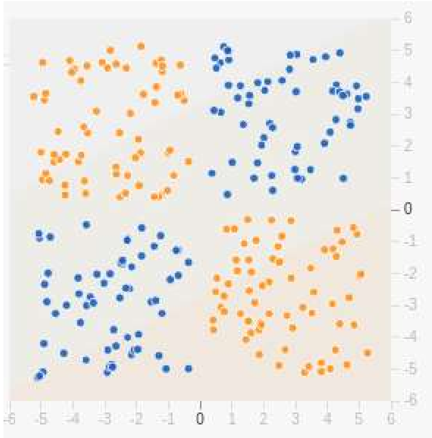

Question 2

0.0/1.0 point (graded)

You have to learn a classification model for the above two-dimensional dataset. Orange points belong to class zero, and blue points belong to class one, which of the following model has the potential to learn?

- Single-layer perceptron with linear activation
- Single-layer perceptron with ReLU activation ✖
- Multi-layer perceptron with linear activation.
- None of the above

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Question 3

1.0/1.0 point (graded)

Which of the following loss function is more robust to outliers?

- Mean Square Error
- Mean Absolute Error ✔
- Both are equivalent
- Nothing can be said before training.

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Question 4

1.0/1.0 point (graded)

Suppose you are solving an image 3-class classification problem. During the data exploration, you found that the ratio of the number of images for classes 0, 1, and 2 is 3:2:1. Which of the following loss function is best suited for the problem?

- Root Mean Square
- Absolute Error
- Cross-Entropy
- Cross-Entropy with Weight ✔

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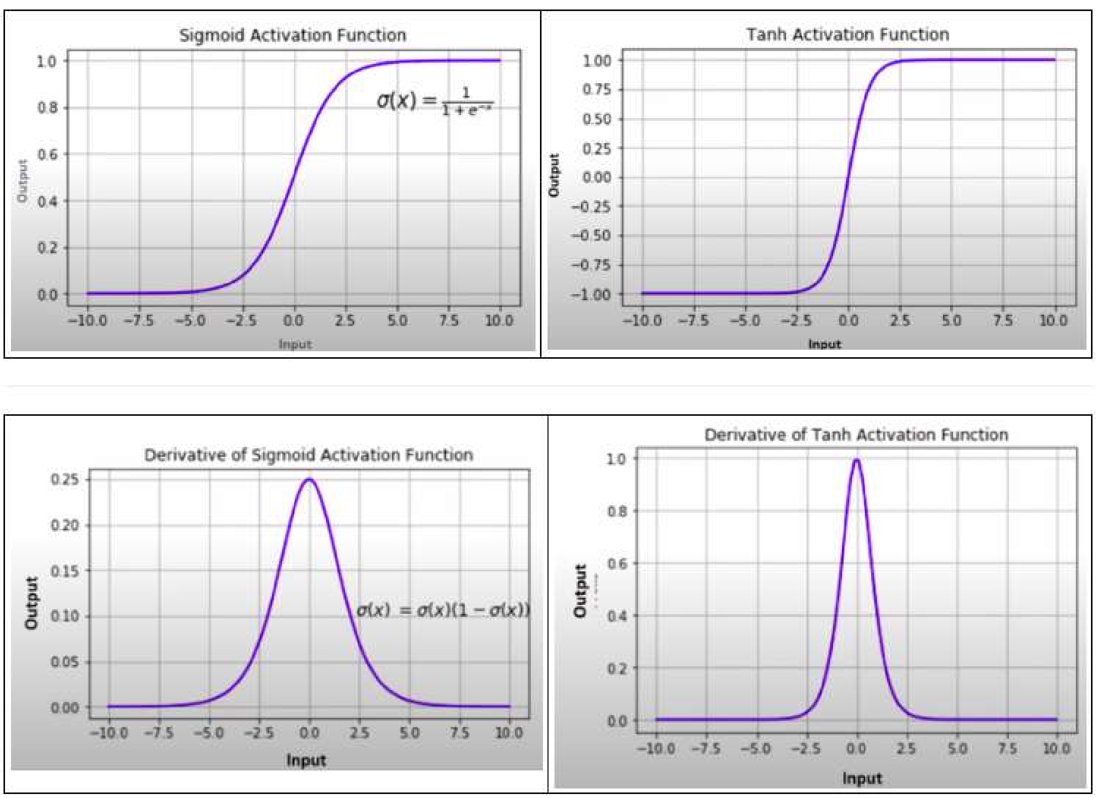

Question 5

1.0/1.0 point (graded)

If the weight is properly initialized and inputs are normalized (with mean and std), which of the following statement is true?

- Sigmoid is more prone to vanishing gradient problem compare to Tanh. ✔
- Tanh is more prone to vanishing gradient problem compare to Sigmoid.
- Sigmoid and Tanh, both are equally prone to vanishing gradient problem.
- Just looking at the above graph and given information, it is not possible to jump to the conclusion.

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Question 6

0.0/1.0 point (graded)

The input image size is (28, 28, 3) (colored image with RGB channel), and the convolution layers with eight filters that kernel size is (3, 3) with no bias. What is the total number of weights parameters in the convolution layers?

- 28 x 28 x 3 x 3 x 3 x 8
- 28 x 28 x 3 x 3 x 8 ✖
- 3 x 3 x 3 x 8
- 3 x 3 x 8

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Input Image	Output Image 1	Output Image 2
		

Question 7

1.0/1.0 point (graded)

We have an input image and two filters, $kernel_a$ and $kernel_b$. The image is convolved through these two filters, and we have two output images corresponds to these two filters.

$$kernel_a = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 0 & -1 \\ 1 & 0 & -1 \end{bmatrix}$$

$$kernel_b = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 0 & 0 \\ -1 & -1 & -1 \end{bmatrix}$$

Which of the following combinations for filters and output images are correct?

- ($kernel_a$, output image 1) and ($kernel_b$, output image 2) ✔
- ($kernel_a$, output image 2) and ($kernel_b$, output image 1)
- ($kernel_a$, output image 1) and ($kernel_b$, output image 1)
- ($kernel_a$, output image 2) and ($kernel_b$, output image 2)

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Let's assume the following NumPy arrays:

```
x = [0, 0, 0]

y = [[1],
    [1],
    [1],
    [1]]

z = [[1, 1],
    [1, 1],
    [1, 1],
    [1, 1]]
```

Question 8

0.75/1.0 point (graded)

For the above NumPy arrays - x, y and z, which of the following operations are valid (assuming arrays are broadcastable)?

- x + y
- y + z
- z + x
- np.matmul((x+y), z)

✱

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Question 9

0.75/1.0 point (graded)

Which of the following operations have learnable parameters?

- ReLU
- Convolution 2D
- Batch Norm
- Max Pool

✱

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Question 10

0.5/1.0 point (graded)

The two main advantages of Convolutional Networks over Feed Forward networks are

- Have fewer parameters
- Computation speed
- Translation invariance
- Rotation invariance

*

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