1. What does a neuron compute? **1 / 1 point**

- A neuron computes a function g that scales the input x linearly (Wx + b)
- A neuron computes a linear function $z = Wx + b$ followed by an activation function
- A neuron computes an activation function followed by a linear function $z = Wx + b$
- A neuron computes the mean of all features before applying the output to an activation function

Expand

Correct
Correct, we generally say that the output of a neuron is a = g(Wx + b) where g is the activation function (sigmoid, tanh, ReLU, ...).

2. Suppose that $\hat{y} = 0.9$ and $y = 1$. What is the value of the "Logistic Loss"? Choose the best option. **1 / 1 point**

- 0.005
- $+\infty$
- 0.105
-

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Expand

Correct
Yes. Since $$\mathcal{L}(\hat{y}, y) = - \left(y \, \log \hat{y} + (1-y)\ \log (1 - \hat{y}) \right) $$, for the given values we get $$ \mathcal{L}(\hat{y}, y) = - \left(1 \, \log 0.9 + 0 \, \log 0.1 \right)$$

3. Consider the Numpy array x: **1 / 1 point**

$x = np.array([[[1], [2]], [[3], [4]]])$

What is the shape of x?

- (1, 2, 2)
- (2,2,1)
- (2, 2)
- (4,)

Expand

Correct
Yes. This array has two rows and in each row it has 2 arrays of 1x1.

4. Consider the following random arrays a and b, and c: **1 / 1 point**

$a = np.random.randn(2,3) \# a.shape = (2,3)$

$b = np.random.randn(2,1) \# b.shape = (2,1)$

$c = a + b$

What will be the shape of c?

- c.shape = (3, 2)
- The computation cannot happen because the sizes don't match. It's going to be "Error"!
- c.shape = (2, 3)
- c.shape = (2, 1)

Expand

Correct
Yes! This is broadcasting. b (column vector) is copied 3 times so that it can be summed to each column of a.

5. Consider the two following random arrays a and b: **0 / 1 point**

$a = np.random.randn(4,3) \# a.shape = (4,3)$

$b = np.random.randn(3,2) \# b.shape = (3,2)$

$c = a * b$

What will be the shape of c?

- c.shape = (4,2)
- The computation cannot happen because the sizes don't match. It's going to be "Error"!
- c.shape = (4, 3)
- c.shape = (3, 3)

Expand

Incorrect
No! In numpy the "*" operator indicates element-wise multiplication. The broadcasting cannot happen because of the shape of b. b should have been something like (4, 1) or (1, 3) to broadcast properly.

6. Suppose our input batch consists of 8 grayscale images, each of dimension 8x8. We reshape these images into feature column vectors $\mathbf{x}^j$. Remember that $X = \left[\mathbf{x}^{(1)}\mathbf{x}^{(2)} \cdots \mathbf{x}^{(8)}\right]$. What is the dimension of X? **1 / 1 point**

- (8, 64)
- (8, 8, 8)
- (64, 8)

(512, 1)

Expand

Correct
Yes. After converting the 8x8 gray scale images to a column vector we get a vector of size $$64$$, thus $$X$$ has dimension $$(64, 8)$$.

7. Consider the following array: **1 / 1 point**

$a = np.array([[2, 1], [1, 3]])$

What is the result of $np.dot(a, a)$?

$\begin{pmatrix} 4 & 2 \\ 2 & 6 \end{pmatrix}$

$\begin{pmatrix} 5 & 5 \\$

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Expand

Correct
Yes, recall that * indicates the element wise multiplication and that np.dot() is the matrix multiplication. Thus $$ \begin{pmatrix} (2)(2) + (1)(1) & (2)(1) + (1)(3) \\ (1)(2) + (3)(1) & (1)(1) + (3)(3) \end{pmatrix} $$.

8. Consider the following code snippet: **1 / 1 point**

$a.shape = (3, 4)$

$b.shape = (4, 1)$

for i in range(3):

for j in range(4):

c[i][j] = a[i][j]*b[j]

How do you vectorize this?

c = np.dot(a,b)

c = a*b

c = a.T*b

c = a*b.T

Expand

Correct

Correct

Yes. b.T gives a column vector with shape (1, 4). The result of c is equivalent to broadcasting a*b.T.

9. Consider the following arrays: **0 / 1 point**

$a = np.array([[1, 1], [1, -1]])$

$b = np.array([[2], [3]])$

$c = a + b$

Which of the following arrays is stored in c?

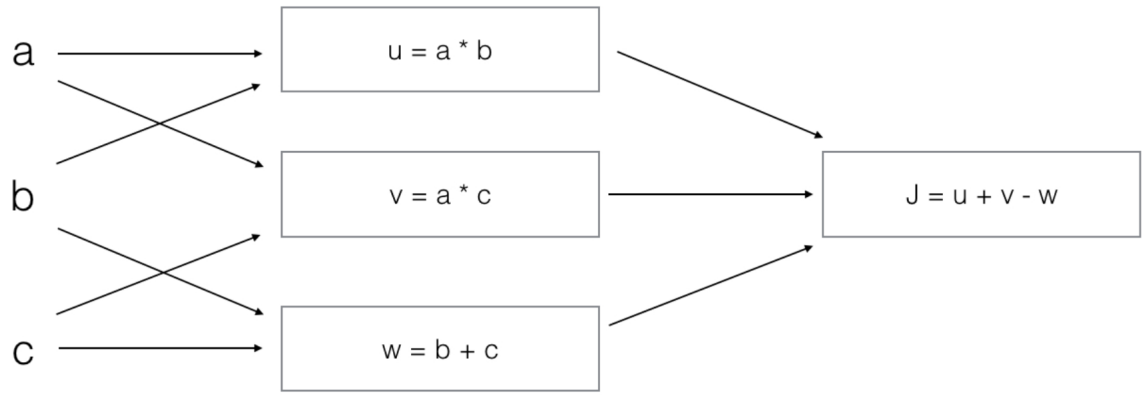
- $\begin{matrix} 3 & 4 \\ 3 & 2 \end{matrix}$
- The computation cannot happen because the sizes don't match. It's going to be an "Error"!
- $\begin{pmatrix} 3 & 3 \\ 3 & 1 \\ 4 & 4 \\ 5 & 2 \end{pmatrix}$
- $3 \quad 3$

Expand

Incorrect

No. The array b is a column vector. This is copied two times and added to the array a to construct the array c.

10. Consider the following computation graph. **1 / 1 point**



What is the output J?

- $J = (b - 1) * (c + a)$
- $J = (c - 1) * (b + a)$
- $J = (a - 1) * (b + c)$
- $J = a * b + b * c + a * c$

Expand

Correct

Yes. $$J = u + v - w = a*b + a*c - (b + c) = a * (b + c) - (b + c) = (a - 1) * (b + c)$$.