1. In logistic regression given $\mathbf{x}$ and parameters $w \in \mathbb{R}^{n_x}, b \in \mathbb{R}$. Which of the following best expresses what we want $\hat{y}$ to tell us?

- (●) $P(y = 1|\mathbf{x})$
- ( ) $\sigma(W\,\mathbf{x} + b$
- ( ) $\sigma(W\,\mathbf{x})$
- ( ) $P(y = \hat{y}|\mathbf{x})$

Correct
Yes. We want the output $\hat{y}$ to tell us the probability that $y = 1$ given $\mathbf{x}$.

2. Suppose that $\hat{y} = 0.5$ and $y = 0$. What is the value of the "Logistic Loss"? Choose the best option.

- (●) $+\infty$
- ( ) $\mathcal{L}(\hat{y}, y) = -\left(y\,\log\hat{y} + (1-y)\,\log(1-\hat{y})\right)$
- ( ) 0.5
- ( ) 0.693

3. Consider the Numpy array x:

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

What is the shape of x?

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

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:

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

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

$c = a + b$

What will be the shape of c?

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

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:

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

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

$c = a * b$

What will be the shape of c?

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

Correct
Indeed! In numpy the "*" operator indicates element-wise multiplication. It is different from "np.dot()". If you would try "c = np.dot(a,b)" you would get c.shape = (4, 2).

6. Suppose you have n_x input features per example. Recall that $X = [x^{(1)}x^{(2)}...x^{(m)}]$. What is the dimension of X?

- ○ (m, n_x)
- ◉ (n_x, m)
- ○ $(m, 1)$
- ○ $(1, m)$

Correct

7. Consider the following array:

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

What is the result of $a * a$?

- ◉ The computation cannot happen because the sizes don't match. It's going to be an "Error"!
- ○ $\begin{pmatrix} 4 & 1 \\ 1 & 9 \end{pmatrix}$
- ○ $\begin{pmatrix} 4 & 2 \\ 2 & 6 \end{pmatrix}$
- ○ $\begin{pmatrix} 5 & 5 \\ 5 & 10 \end{pmatrix}$

8.Consider the following code snippet:

a.shape = (3, 4)$a.shape$=(3,4)

b.shape = (4, 1)$b.shape$=(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 = a.T*b
- ○ c = a*b
- ◉ c = a*b.T
- ○ c = np.dot(a,b)

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:

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

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

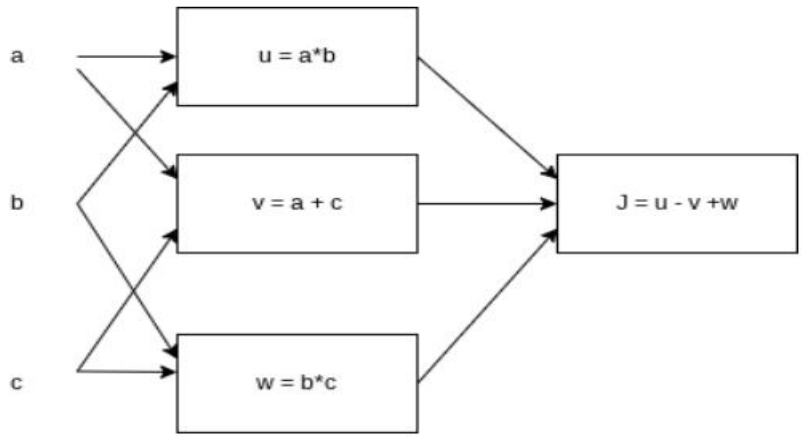
$c = a + b$

Which of the following arrays is stored in c?

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

Correct
Yes. The array b is a column vector. This is copied two times and added to the array a to construct the array

10. Consider the following computational graph.



What is the output of J?

- ○ $(a-1)(b+c)$
- ◉ $(a+c)(b-1)$
- ○ $(c-1)(a+c)$
- ○ $ab+bc+ac$

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