

Neural Network Basics

1.

Question 1

In logistic regression given the input \mathbf{x} , and parameters $\mathbf{w} \in \mathbb{R}^n$, $b \in \mathbb{R}$, how do we generate the output \hat{y} ?

1 / 1 point

Expand

Correct

Right, in logistic regression we use a linear function $\mathbf{w} \cdot \mathbf{x} + b$ followed by the sigmoid function σ , to get an output y , referred to as \hat{y} , such that $0 < \hat{y} < 1$.

2.

Question 2

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

0 / 1 point

Expand

Incorrect

No. The "Logistic Loss" function is defined by $L(\hat{y}, y) = -\left(y \log \hat{y} + (1-y) \log (1 - \hat{y}) \right)$. To evaluate we must use $\hat{y} = 0.9$ and $y = 1$.

3.

Question 3

Suppose x is a (8, 1) array. Which of the following is a valid reshape?

1 / 1 point

Expand

Correct

Yes. This generates uses $2 \times 2 \times 2 = 8$ entries.

4.

Question 4

Consider the following random arrays a and b , and c :

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

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

```
c = a + b
```

What will be the shape of c ?

1 / 1 point

Expand

Correct

Yes. It is not possible to broadcast together a and b . In this case there is no way to generate copies of one of the arrays to match the size of the other.

5.

Question 5

Consider the two following random arrays a and b :

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

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

```
c = a*b
```

What will be the shape of c ?

1 / 1 point

Expand

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.

Question 6

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

1 / 1 point

Expand

Correct

7.

Question 7

Recall that `np.dot(a,b)` performs a matrix multiplication on a and b , whereas `a*b` performs an element-wise multiplication.

Consider the two following random arrays a and b :

```
a = np.random.randn(12288, 150)a=np.random.randn(12288,150)
```

```
# a.shape = (12288, 150)a.shape=(12288,150)
```

```
b = np.random.randn(150, 45)b=np.random.randn(150,45)
```

```
# b.shape = (150, 45)b.shape=(150,45)
```

```
c = np.dot(a,b)
```

What is the shape of c ?

1 / 1 point

Expand

Correct

Correct, remember that $\text{np.dot}(a, b)$ has shape (number of rows of a , number of columns of b). The sizes match because: "number of columns of $a = 150 = \text{number of rows of } b$ "

8.

Question 8

Consider the following code snippet:

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

```
b.shape = (4, 1)b.shape=(4,1)
```

```
for i in range(3):
```

```
    for j in range(4):
```

```
        c[i][j] = a[j][i] + b[j]
```

How do you vectorize this?

0 / 1 point

Expand

Incorrect

No. Notice that b is a column vector; but we are using it to fill the row i of c .

9.

Question 9

Consider the following arrays:

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

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

```
c = a + b c=a+b
```

Which of the following arrays is stored in c ?

1 / 1 point

Expand

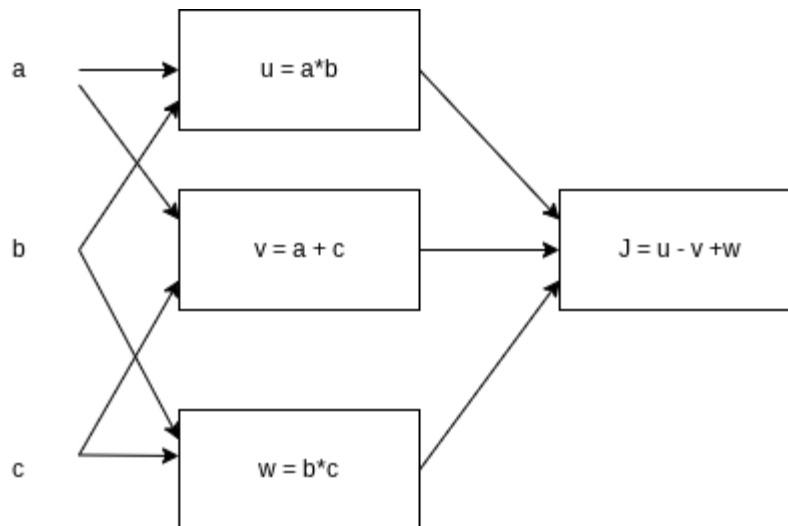
Correct

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

10.

Question 10

Consider the following computational graph.



What is the output of J?

1 / 1 point

Expand

Correct

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

1.

Question 1

What does a neuron compute?

1 / 1 point

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.

Question 2

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

0 / 1 point

Expand

Incorrect

No. This is not the definition of the Logistic Loss function.

3.

Question 3

Suppose `img` is a (32,32,3) array, representing a 32x32 image with 3 color channels red, green and blue. How do you reshape this into a column vector `xx`?

1 / 1 point

Expand

Correct

4.

Question 4

Consider the following random arrays a and b , and c :

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

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

```
c = a + b c=a+b
```

What will be the shape of c ?

1 / 1 point

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.

Question 5

Consider the two following random arrays a and b :

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

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

```
c = a*b c=a*b
```

What will be the shape of c ?

1 / 1 point

Expand

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.

Question 6

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

1 / 1 point

Expand

Correct

7.

Question 7

Consider the following array:

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

What is the result of $a*a*a$?

1 / 1 point

Expand

Correct

Yes, recall that $*$ indicates element-wise multiplication.

8.

Question 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?

0 / 1 point

Expand

Incorrect

No. The result c is a (3,4) array; the matrix multiplication gives a (3, 1) array as result.

9.

Question 9

Consider the following arrays:

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

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

```
c = a + b
```

Which of the following arrays is stored in c ?

1 / 1 point

Expand

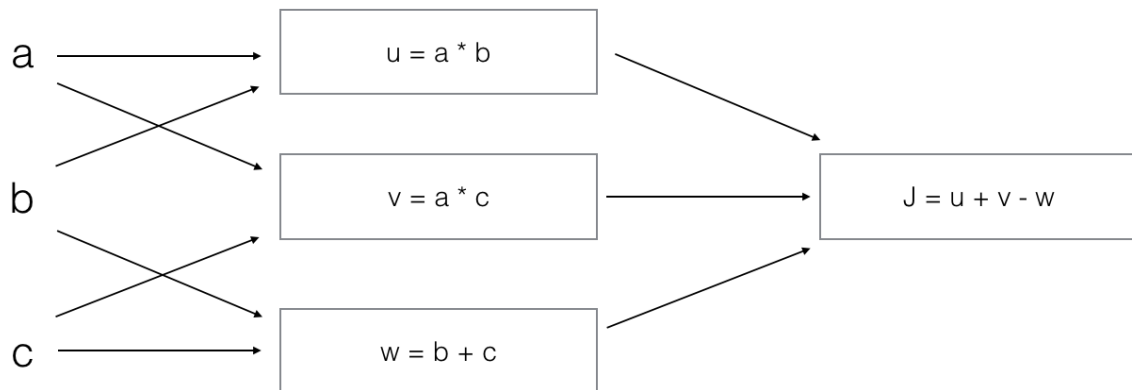
Correct

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

10.

Question 10

Consider the following computation graph.



What is the output J?

0 / 1 point

Expand

Incorrect

No. $J = u + v - w = a*b + a*c - (b + c) = a * (b + c) - (b + c) = (a - 1) * (b + c)$
 $J = u + v - w = a*b + a*c - (b + c) = a*(b + c) - (b + c) = (a - 1)*(b + c)$

1.

Question 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?

0 / 1 point

Expand

Incorrect

No. We want the output \hat{y} to tell us the probability that $y = 1$ given x .

2.

Question 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

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.

Question 3

Suppose `img` is a (32,32,3) array, representing a 32x32 image with 3 color channels red, green and blue. How do you reshape this into a column vector `xx`?

1 / 1 point

Expand

Correct

4.

Question 4

Consider the following random arrays `aa` and `bb`, and `cc`:

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

```
b = np.random.randn(1, 4)b=np.random.randn(1,4) # b.shape = (1, 4)b.shape=(1,4)
```

```
c = a + bc=a+b
```

What will be the shape of `cc`?

1 / 1 point

Expand

Correct

Yes. Broadcasting is used, so row `b` is copied 3 times so it can be summed to each row of `a`.

5.

Question 5

Consider the two following random arrays `aa` and `bb`:

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

```
b = np.random.randn(1, 3)b=np.random.randn(1,3) # b.shape = (1, 3)b.shape=(1,3)
```

```
c = a*bc=a*b
```

What will be the shape of `cc`?

1 / 1 point

Expand

Correct

Yes. Broadcasting is invoked, so row `b` is multiplied element-wise with each row of `a` to create `c`.

6.

Question 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 $X = \begin{bmatrix} \mathbf{x}^{(1)} & \mathbf{x}^{(2)} & \cdots & \mathbf{x}^{(8)} \end{bmatrix}$. What is the dimension of XX ?

0 / 1 point

Expand

Incorrect

No. After converting the 8x8 gray scale images to a column vector we get a vector of size 64, thus XX has dimension $(64, 8)(64, 8)$.

7.

Question 7

Consider the following array:

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

What is the result of a^*a^*a ?

1 / 1 point

Expand

Correct

Yes, recall that $*$ indicates element-wise multiplication.

8.

Question 8

Consider the following code snippet:

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

```
b.shape = (4, 1)
```

```
for i in range(3):
```

```
    for j in range(4):
```

```
        c[i][j] = a[j][i] + b[j]
```

How do you vectorize this?

0 / 1 point

Expand

Incorrect

No. The $a[j][i]$ being assigned to $a[i][j]$ indicates that we are using $a.T$.

9.

Question 9

Consider the code snippet:

```
a.shape = (3, 3)
```

```
b.shape = (3, 3)
```

```
c = a**2 + b.T**2
```

Which of the following gives an equivalent output for c ?

0 / 1 point

Expand

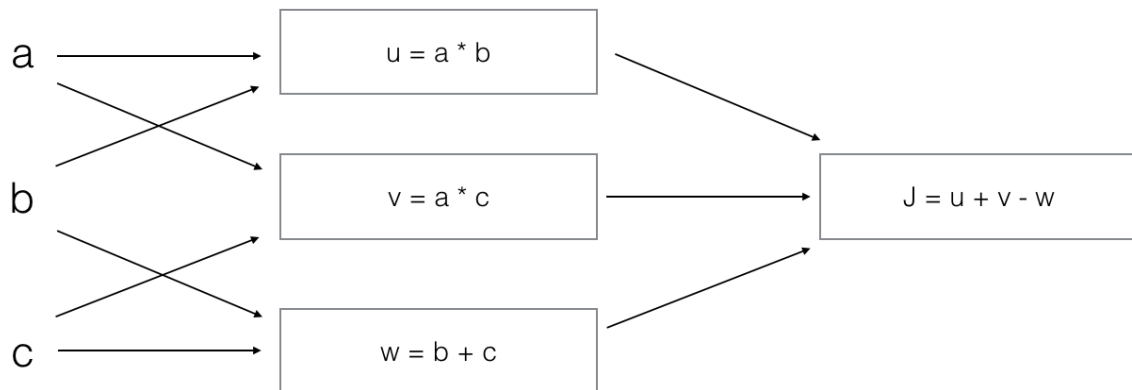
Incorrect

No. Notice that to operate with $b.T$ we need to use $b[j][i]$.

10.

Question 10

Consider the following computation graph.



What is the output J ?

1 / 1 point

Expand

Correct

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