

Neural Network Basics

8/10 points (80%)

Quiz, 10 questions

 **Congratulations! You passed!**
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points

1.

What does a neuron compute?

A neuron computes a linear function ($z = Wx + b$) followed by an activation function**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, ...).

A neuron computes the mean of all features before applying the output to an activation function

A neuron computes a function g that scales the input x linearly ($Wx + b$)A neuron computes an activation function followed by a linear function ($z = Wx + b$)1 / 1
points

2.

Which of these is the "Logistic Loss"?

 $\mathcal{L}^{(i)}(\hat{y}^{(i)}, y^{(i)}) = -(y^{(i)} \log(\hat{y}^{(i)}) + (1 - y^{(i)}) \log(1 - \hat{y}^{(i)}))$ **Correct**

Correct, this is the logistic loss you've seen in lecture!

 $\mathcal{L}^{(i)}(\hat{y}^{(i)}, y^{(i)}) = |y^{(i)} - \hat{y}^{(i)}|^2$

$$\mathcal{L}^{(i)}(\hat{y}^{(i)}, y^{(i)}) = \max(0, y^{(i)} - \hat{y}^{(i)})$$

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$$\mathcal{L}^{(i)}(\hat{y}^{(i)}, y^{(i)}) = |y^{(i)} - \hat{y}^{(i)}|$$

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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?

- ☐ x = img.reshape((3,32*32))
- ☐ x = img.reshape((32*32,3))
- ☐ x = img.reshape((1,32*32,*3))
- ☒ x = img.reshape((32*32*3,1))

Correct

1 / 1
points

4.

Consider the two following random arrays "a" and "b":

```
1 a = np.random.randn(2, 3) # a.shape = (2, 3)
2 b = np.random.randn(2, 1) # b.shape = (2, 1)
3 c = a + b
```

What will be the shape of "c"?



c.shape = (2, 3)

Correct

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

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The computation cannot happen because the sizes don't match.
It's going to be "Error"!



c.shape = (3, 2)


 1 / 1
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5.

Consider the two following random arrays "a" and "b":

```
1 a = np.random.randn(4, 3) # a.shape = (4, 3)
2 b = np.random.randn(3, 2) # b.shape = (3, 2)
3 c = a*b
```

What will be the shape of "c"?



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).



c.shape = (4,2)



c.shape = (3, 3)



c.shape = (4, 3)


 1 / 1
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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?

 (n_x, m)

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 $(1, m)$  $(m, 1)$  (m, n_x) 1 / 1
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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`":

```
1 a = np.random.randn(12288, 150) # a.shape = (12288, 150)
2 b = np.random.randn(150, 45) # b.shape = (150, 45)
3 c = np.dot(a,b)
```

What is the shape of `c`?

`c.shape = (12288, 45)`**Correct**

Correct, remember that a `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 = number of rows of `b`"



The computation cannot happen because the sizes don't match.
It's going to be "Error"!

`c.shape = (12288, 150)``c.shape = (150,150)`0 / 1
points

8.

Consider the following code snippet:

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```
1 a.shape = (3,4)
2 # b.shape = (4,1)
3
4 for i in range(3):
5     for j in range(4):
6         c[i][j] = a[i][j] + b[j]
```

How do you vectorize this?



$c = a.T + b$



This should not be selected



$c = a + b.T$



$c = a.T + b.T$



$c = a + b$



0 / 1
points

9.

Consider the following code:

```
1 a = np.random.randn(3, 3)
2 b = np.random.randn(3, 1)
3 c = a*b
```

What will be c ? (If you're not sure, feel free to run this in python to find out).



This will invoke broadcasting, so b is copied three times to become $(3,3)$, and $*$ is an element-wise product so $c.shape$ will be $(3, 3)$



This will invoke broadcasting, so b is copied three times to become $(3, 3)$, and $*$ invokes a matrix multiplication operation of two 3×3 matrices so $c.shape$ will be $(3, 3)$



This should not be selected



This will multiply a 3×3 matrix a with a 3×1 vector, thus resulting in a 3×1 vector. That is, $c.shape = (3,1)$.





It will lead to an error since you cannot use "*" to operate on these two matrices. You need to instead use np.dot(a,b)

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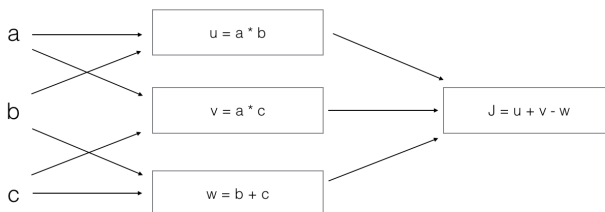
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points

10.

Consider the following computation graph.



What is the output J?



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



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

Correct

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



$$J = a*b + b*c + a*c$$



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

