C1W2 Quiz~Neural-Network-Basics

1. What does a neuron compute?

   ☑ ~~A neuron computes a linear function (z = Wx + b) followed by an activation function~~

   💡 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 an activation function followed by a linear function (z = Wx + b)**

   ☐ **A neuron computes a function g that scales the input x linearly (Wx + b)**

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

2. Which of these is the "Logistic Loss"?

   ☐ **$L(i)(y\hat{}(i), y(i)) = max(0, y(i)-y\hat{}(i))$**

   ☑ ~~$L(i)(y\hat{}(i), y(i)) = -(y(i)\log(y\hat{}(i))+(1-y(i))\log(1-y\hat{}(i)))$~~

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

   ☐ **$L(i)(y\hat{}(i), y(i)) = | y(i)-y\hat{}(i) |\hat{}2$**

   ☐ **$L(i)(y\hat{}(i), y(i)) = | y(i)-y\hat{}(i) |$**

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((32*32,3))**

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

   ☐ **x = img.reshape((3,32*32))**

- [x] ~~x = img.reshape((32*32*3,1))~~

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

```
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)**
- [x] ~~c.shape = (2, 3)~~

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

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

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 = (3, 3)**
- [x] ~~The computation cannot happen because the sizes don't match. It's going to be "Error"!~~

💡 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)**

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

   - [ ] **(*m*,1)**
   - [x] ~~***(nx,m)***~~
   - [ ] **(1,*m*)**
   - [ ] **(*m*,*nx*)**

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

   What is the shape of c?

   - [ ] **c.shape = (12288, 150)**
   - [x] ~~**c.shape = (12288, 45)**~~

   💡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"

   - [ ] **c.shape = (150,150)**
   - [ ] **The computation cannot happen because the sizes don't match. It's going to be "Error"!**

8. Consider the following code snippet:

   ```
   # 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?

- [x] ~~c = a + b.T~~
- [ ] **c = a.T + b.T**
- [ ] **c = a.T + b**
- [ ] **c = a + b**

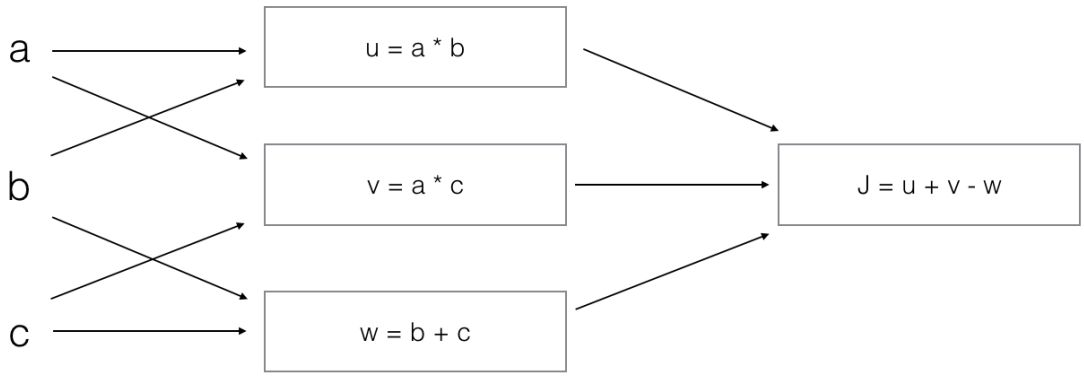
9. Consider the following code:

```
a = np.random.randn(3, 3)
b = np.random.randn(3, 1)
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 ∗ invokes a matrix multiplication operation of two 3x3 matrices so c.shape will be (3, 3)**
- [ ] **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)**
- [ ] **This will multiply a 3x3 matrix a with a 3x1 vector, thus resulting in a 3x1 vector. That is, c.shape = (3,1).**
- [x] ~~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)~~

10. Consider the following computation graph.



What is the output J?

☑ ~~J = (a - 1) * (b + c)~~

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

☐ **J = (b - 1) * (c + a)**

☐ **J = a*b + b*c + a*c**

☐ **J = (c - 1)*(b + a)**