

✓ Congratulations! You passed!

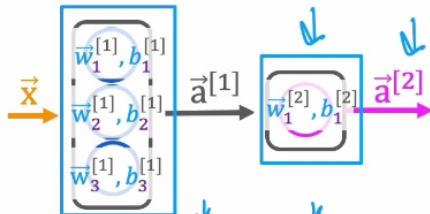
Grade received 100% Latest Submission Grade 100% To pass 80% or higher

Go to next item

1.

1 / 1 point

## forward prop (coffee roasting model)



$x = \text{np.array}([200, 17])$

1D arrays

$$a_1^{[1]} = g(\bar{w}_1^{[1]} \cdot \bar{x} + b_1^{[1]})$$

$$a_2^{[1]} = g(\bar{w}_2^{[1]} \cdot \bar{x} + b_2^{[1]})$$

$$a_3^{[1]} = g(\bar{w}_3^{[1]} \cdot \bar{x} + b_3^{[1]})$$

$w1\_1 = \text{np.array}([1, 2])$

$w1\_2 = \text{np.array}([-3, 4])$

$w1\_3 = \text{np.array}([5, -6])$

$b1\_1 = \text{np.array}([-1])$

$b1\_2 = \text{np.array}([1])$

$b1\_3 = \text{np.array}([2])$

$z1\_1 = \text{np.dot}(w1\_1, x) + b1\_1$

$z1\_2 = \text{np.dot}(w1\_2, x) + b1\_2$

$z1\_3 = ?$

$a1\_1 = \text{sigmoid}(z1\_1)$

$a1\_2 = \text{sigmoid}(z1\_2)$

$a1\_3 = ?$

$a1 = \text{np.array}([a1\_1, a1\_2, a1\_3])$

$$a_1^{[2]} = g(\bar{w}_1^{[2]} \cdot \bar{a}^{[1]} + b_1^{[2]})$$

$\Rightarrow w2\_1 = \text{np.array}([-7, 8, 9])$

$\Rightarrow b2\_1 = \text{np.array}([3])$

$\Rightarrow z2\_1 = \text{np.dot}(w2\_1, a1) + b2\_1$

$\Rightarrow a2\_1 = \text{sigmoid}(z2\_1)$

$w_1^{[2]}$   $w2\_1$

According to the lecture, how do you calculate the activation of the third neuron in the first layer using NumPy?

☐

`layer_1 = Dense(units=3, activation='sigmoid')`

`a_1 = layer_1(x)`

☐

`z1_3 = w1_3 * x + b`

`a1_3 = sigmoid(z1_3)`

☒

`z1_3 = np.dot(w1_3, x) + b1_3`

`a1_3 = sigmoid(z1_3)`

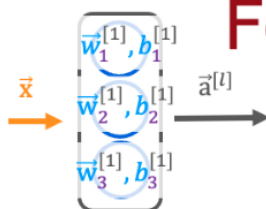
✓ Correct

Correct. Use the `numpy.dot` function to take the dot product. The `sigmoid` function shown in lecture can be a function that you write yourself (see course 1, week 3 of this specialization), and that will be provided to you in this course.

2.

1 / 1 point

## Forward prop in NumPy



$\bar{w}_1^{[1]} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$   $\bar{w}_2^{[1]} = \begin{bmatrix} -3 \\ 4 \end{bmatrix}$   $\bar{w}_3^{[1]} = \begin{bmatrix} 5 \\ -6 \end{bmatrix}$

$W = \text{np.array}([$

```
def dense(a_in, W, b, g):
    units = W.shape[1]
    a_out = np.zeros(units)
    for j in range(units):
        w = W[:, j]
        z = np.dot(w, a_in) + b[j]
        a_out[j] = g(z)
```

$$\begin{bmatrix} 1, & -3, & 5 \\ 2, & 4, & -6 \end{bmatrix}) \text{ 2 by 3}$$

```
a_out[j] = g(z)
return a_out
```

$$b_1^{[l]} = -1 \quad b_2^{[l]} = 1 \quad b_3^{[l]} = 2$$

```
b = np.array([-1, 1, 2])
```

$$\vec{a}^{[0]} = \vec{x}$$

```
a_in = np.array([-2, 4])
```

According to the lecture, when coding up the numpy array W, where would you place the w parameters for each neuron?

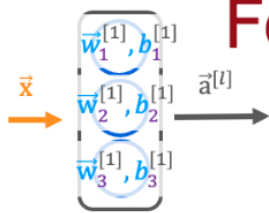
- ☒ In the columns of W.
- ☐ In the rows of W.

✓ Correct

Correct. The w parameters of neuron 1 are in column 1. The w parameters of neuron 2 are in column 2, and so on.

3.

1 / 1 point



## Forward prop in NumPy

$$\vec{w}_1^{[1]} = \begin{bmatrix} 1 \\ 2 \end{bmatrix} \quad \vec{w}_2^{[1]} = \begin{bmatrix} -3 \\ 4 \end{bmatrix} \quad \vec{w}_3^{[1]} = \begin{bmatrix} 5 \\ -6 \end{bmatrix}$$

```
W = np.array([
    [1, -3, 5],
    [2, 4, -6]]) \text{ 2 by 3}
```

$$b_1^{[l]} = -1 \quad b_2^{[l]} = 1 \quad b_3^{[l]} = 2$$

```
b = np.array([-1, 1, 2])
```

$$\vec{a}^{[0]} = \vec{x}$$

```
a_in = np.array([-2, 4])
```

```
def dense(a_in, W, b, g):
    units = W.shape[1]
    a_out = np.zeros(units)
    for j in range(units):
        w = W[:, j]
        z = np.dot(w, a_in) + b[j]
        a_out[j] = g(z)
    return a_out
```

For the code above in the "dense" function that defines a single layer of neurons, how many times does the code go through the "for loop"? Note that W has 2 rows and 3 columns.

- ☐ 5 times
- ☐ 6 times
- ☐ 2 times
- ☒ 3 times

✓ Correct

Yes! For each neuron in the layer, there is one column in the numpy array W. The for loop calculates the activation value for each neuron. So if there are 5 columns in W, there are 5 neurons in the dense layer, and therefore the for loop goes through 5 iterations (one for each neuron).