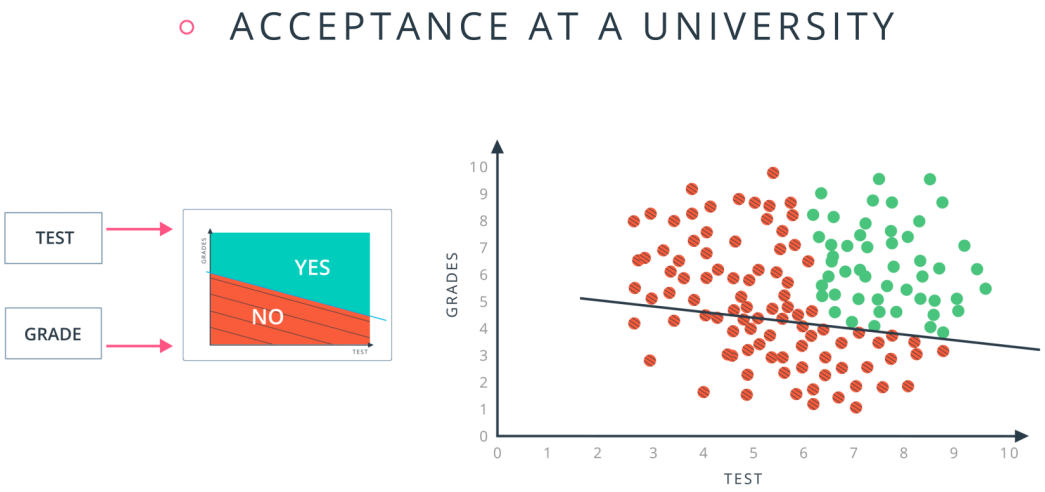
AND Perceptron Quiz



What are the weights and bias for the AND perceptron?

Set the weights (`weight1`, `weight2`) and bias `bias` to the correct values that calculate AND operation as shown above.

In this case, there are two inputs as seen in the table above (let's call the first column `input1` and the second column `input2`), and based on the perceptron formula, we can calculate the output.

First, the linear combination will be the sum of the weighted inputs: `linear_combination = weight1*input1 + weight2*input2` then we can put this value into the *biased* Heaviside step function, which will give us our output (0 or 1):

$$f(x_1, x_2, \ldots, x_m) = \begin{cases} 0 & \text{if } b + \sum w_i * x_i < 0 \\ 1 & \text{otherwise} \end{cases}$$

Perceptron Formula

```
1  import pandas as pd
2
3  # TODO: Set weight1, weight2, and bias
4  weight1 = 1.0
5  weight2 = 1.0
6  bias = -2.0
7
```

```
8
```

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```
14
15  # Generate and check output
16  for test_input, correct_output in zip(test_inputs, correct_outputs):
17      linear_combination = weight1 * test_input[0] + weight2 * test_input[1] + bia
18      output = int(linear_combination >= 0)
19      is_correct_string = 'Yes' if output == correct_output else 'No'
20      outputs.append([test_input[0], test_input[1], linear_combination, output, is
21
22  # Print output
23  num_wrong = len([output[4] for output in outputs if output[4] == 'No'])
24  output_frame = pd.DataFrame(outputs, columns=['Input 1', '  Input 2', '  Linear
25  if not num_wrong:
26      print('Nice!  You got it all correct.\n')
27  else:
28      print('You got {} wrong.  Keep trying!\n'.format(num_wrong))
29  print(output_frame.to_string(index=False))
30
```

```
Nice!  You got it all correct.

Input 1    Input 2    Linear Combination    Activation Output    Is Correct
      0          0                  -2.0                    0           Yes
      0          1                  -1.0                    0           Yes
      1          0                  -1.0                    0           Yes
      1          1                   0.0                    1           Yes
```

If you still need a hint, think of a concrete example like so:

Consider input1 and input2 both = 1, for an AND perceptron, we want the output to also equal 1! The output is determined by the weights and Heaviside step function such that

```
output = 1, if  weight1*input1 + weight2*input2 + bias >= 0
or
output = 0, if  weight1*input1 + weight2*input2 + bias < 0
```

So, how can you choose the values for weights and bias so that if both inputs = 1, the output = 1?