Python Logical Operators  
Logic gates, as discussed in Appendix XYZ, have one output, and may have one or more inputs. The state of the output depends on that of the inputs; the presence of energy represents binary, logical level, 1, and the absence represents binary, logical level, 0. Here are terms you will hear when discussing logic levels:   
on = high = true = 1   
off = low = false = 0.

There are many logic gates, but the focus here is on three: AND, OR, and NOT; the reason for this focus is because Python has logical operators with the same name and operate logically the same as these gates.

AND and OR gates  
The AND and OR gates have a minimum of two inputs and one output, and the value for each input combination must be unique; this means each row in the truth table must have unique values; for instance, a two-input gate with inputs named A and B, and output, Y, will have four rows, each with unique input values:

|  |  |  |
| --- | --- | --- |
| Inputs | | Output |
| A | B | Y |
| 0 | 0 |  |
| 0 | 1 |  |
| 1 | 0 |  |
| 1 | 1 |  |

The AND Truth table  
The output for each row is determined as follows: The output is 1, True, when all inputs are 1s and 0, False, otherwise:

|  |  |  |
| --- | --- | --- |
| Input | | Output |
| A | B | Y |
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

|  |  |  |
| --- | --- | --- |
| Input | | Output |
| A | B | Y |
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |

The OR Truth table  
The output of the OR is 0, False, when all inputs are 0s and 1 otherwise:

The NOT Truth table  
NOT always has one input and one output  
The output of the NOT is 1 when the input is 0  
The output of the NOT is 0 when the input is 1

|  |  |
| --- | --- |
| Input | Output |
| A | Y |
| 0 | 1 |
| 1 | 0 |

**Note:**When typing your Python code, the operators must be lowercase, and, or, not

**Assignment:**  
1.   
Type the following at the Python primary prompt; after you type the logical operation and press Enter, Python displays 0 for False or 1 for True

1.   
A.  
>>>a = 0  
>>>b = 1  
>>>a and b

B.  
>>>a = 0  
>>>b = 1  
>>>b and b

C.  
>>>a = 0  
>>>b = 1  
>>>a and a

D.  
>>>a = 0  
>>>not a

2.   
**Repeat** 1a to 1c using the OR operator

**Answers:**Answers are shown without the primary prompt.

1.   
A.  
>>>a = 0  
>>>b = 1  
>>>a and b   
0

B.  
>>>a = 0  
>>>b = 1  
>>>b and b   
1

C.  
>>>a = 0  
>>>b = 1  
>>>a and a   
0

D.  
>>>a = 0  
>>>not a  
1

2.   
Repeat 1a to 1c using the OR operator   
A.  
>>>a = 0  
>>>b = 1  
>>>a or b   
1

B.  
>>>a = 0  
>>>b = 1  
>>>b or b   
1

C.  
>>>a = 0  
>>>b = 1  
>>>a or a   
0