### Relational Operators

A relational operator is a comparison between two values. You will already know the Less Than (<) and Greater Than (>) operators from Math class. You should also be familiar with the Less Than or Equal (<=) and the Greater Than or Equal (>=). The double equals (==) simply represents Equals. Why the different notation? In most programming languages, including Python and Java, we also have the assignment operator (=), which, as you may know, assigns a value to a variable. Thus, to distinguish the two, the languages use ==. Lastly, the (!) represents a NOT. You can thus read (!=) as Not Equal To.

For the following table, provide the boolean value (True or False) for each comparison

| **values** | **a == b**  **(equals)** | **a != b**  **(does not equal)** | **a > b**  **(greater than)** | **a < b**  **(less than)** | **a >= b**  **(greater than or equal)** | **a <= b**  **(less than or equal)** |
| --- | --- | --- | --- | --- | --- | --- |
| a = 2,  b = 5 | F | T | F | T | F | T |
| a = 4  b = 1 | F | T | T | F | T | F |
| a = 5  b = 5 | T | F | F | F | T | T |

### Putting it together

Boolean operators and relational operators can be combined into expressions. You have already seen how these expressions are then used within a program to control program flow. Complete the following table. If you have difficulty, remember your order of operations – brackets are always done first! That is, simplify within the brackets first. For the more complex expressions, show your steps in simplifying

| **Expression** | **Equates to (TRUE or FALSE)** |
| --- | --- |
| (1 < 3) AND (2 < 0) | FALSE |
| (1 < 3) OR (2 < 0) | TRUE |
| (3 >= 5) AND (6 == 6) | FALSE |
| (3 >= 5) OR (6 == 6) | TRUE |
| NOT (6 == 6) | FALSE |

| **a** | **b** | **c** | **d** | **(a != b) OR c** | **((a >= b) AND c) OR d** | **((a < b) OR (c AND (NOT d)))** |
| --- | --- | --- | --- | --- | --- | --- |
| 2 | 4 | T | T | TRUE | TRUE | TRUE |
| 4 | 2 | T | F | TRUE | TRUE | TRUE |
| 3 | 3 | F | T | FALSE | TRUE | TRUE |
| 0 | 12 | F | F | TRUE | FALSE | TRUE |