8.3. Logical operators

There are three **logical operators**: `and`, `or`, and `not`. The semantics (meaning) of these operators is similar to their meaning in English. For example, `x > 0 and x < 10` is true only if `x` is greater than 0 *and* at the same time, x is less than 10. How would you describe this in words? You would say that x is between 0 and 10, not including the endpoints.

`n % 2 == 0 or n % 3 == 0` is true if *either* of the conditions is true, that is, if the number is divisible by 2 *or* divisible by 3. In this case, one, or the other, or both of the parts has to be true for the result to be true.

Finally, the `not` operator negates a boolean expression, so `not x > y` is true if `x > y` is false, that is, if `x` is less than or equal to `y`.

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```
x = 5
print(x>0 and x<10)

n = 25
print(n%2 == 0 or n%3 == 0)

```

```
True
False
```

Activity: 1 -- ActiveCode (ac7_3_1)

Common Mistake!

There is a very common mistake that occurs when programmers try to write boolean expressions. For example, what if we have a variable `number` and we want to check to see if its value is 5, 6, or 7? In words we might say: "number equal to 5 or 6 or 7". However, if we translate this into Python, `number == 5 or 6 or 7`, it will not be correct. The `or` operator must join the results of three equality checks. The correct way to write this is `number == 5 or number == 6 or number == 7`.

This may seem like a lot of typing but it is absolutely necessary. You cannot take a shortcut.

Well, actually, you can take a shortcut but not that way. Later in this chapter you'll learn about the `in` operator for strings and sequences: you could write `number in [5, 6, 7]`.

Check your understanding

condition-3-1: What is the correct Python expression for checking to see if a number stored in a variable x is between 0 and 5.

- A. x > 0 and < 5
- B. 0 < x < 5
- C. x > 0 or x < 5
- D. x > 0 and x < 5

Check me Compare me

✔ Yes, with an ``and`` keyword both expressions must be true so the number must be greater than 0 an less than 5 for this expression to be true.

Activity: 2 -- Multiple Choice (question7_3_1)

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8.2. Boolean Values and Boolean Expressions">
✔ Completed. Well Done!
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