

Topic 5: Conditionals

David H Smith IV

University of Illinois Urbana-Champaign

Mon, July 05 2021

Announcements

Weekly Reminders

- Ⓐ Don't forget to register with the CBTF to take the quiz this week.
- Ⓑ Homework 4 is posted and homework 3 has entered it's grace period week.
- Ⓒ Post reading 6 due tomorrow.

Poll Questions

Poll Question: Boolean Expressions

Expressions that evaluate to True or False.

```
1 (1 + 6) < (2 + 5)
```

- ☐ A True
- ☐ B False
- ☐ C TypeError
- ☐ D SyntaxError

Poll Question: Boolean Expressions

Expressions that evaluate to True or False.

```
1 "cat" < "Dog"
```

- ☐ A True
- ☐ B False
- ☐ C TypeError
- ☐ D SyntaxError

Relational Ops on Non-numbers

- Ⓐ `ord("c") → 99`
- Ⓑ `ord("D") → 68`
- Ⓒ Strings are compared based on the ASCII values of their characters.
- Ⓓ People often normalize strings before comparisons:
`thing1.lower() < thing2.lower()`

Poll Question: If Statements

What does this code print?

```
1 x = 1
2 if x < 7:
3     print(x)
4 print(7)
```

- ☐ A 1
- ☐ B 7
- ☐ C

1
7
- ☐ D SyntaxError

Poll Question:

What does this code print?

```
1 age = 17
2 young = age < 30
3 if young == true:
4     print(age)
```

- ☐ A Nothing
- ☐ B 17
- ☐ C 30
- ☐ D SyntaxError

Poll Question: If-Else Statements

What does this code print?

```
1 x = 2
2 if x > 8:
3     x = x - 2
4     print(x)
5 else:
6     print(8)
```

- ☐ A 0
- ☐ B 8
- ☒ C

0
8
- ☐ D SyntaxError

Poll Question:

```
1 grade = 98
2 if grade >= 90:
3     print("You got an A!")
4 if grade >= 80:
5     print("You got a B!")
6 else:
7     print("You got something else")
```

- ☐ A You got an A!
- ☐ B You got a B!
- ☐ C You got something else
- ☐ D The correct answer is not listed

Poll Question:

```
1 grade = 98
2 if grade >= 90:
3     print("You got an A!")
4 if grade >= 80 and grade < 90:
5     print("You got a B!")
6 else:
7     print("You got something else")
```

- ☐ A You got an A!
- ☐ B You got a B!
- ☐ C You got something else
- ☐ D The correct answer is not listed

Poll Question: If Statements

What's the result of running the following code?

```
1 x = 5
2 if x == 3 or 4:
3     print(x)
```

- ☐ A 3
- ☐ B 4
- ☐ C 5
- ☐ D SyntaxError

Boolean Operators

Boolean Operators

A Why is `x == 3 or 4` always True?

B Alternatives:

① `x == 3 or x == 4`

② `x in [3, 4]`

C Types of operators:

① **Binary operators:** `and`, `or`

② **Unary Operators:** `not`

Truthy and Falsy

- Ⓐ Python will convert non-Boolean types to Booleans.
`if "hello":`
- Ⓑ Accomplished via the use of the `bool()` function.
`boo("hello")`
- Ⓒ All values are truthy (convert to `True`) except those displayed to the right:

- `None`
- `False`
- `0`
- `0.0`
- `0j`
- `Decimal(0)`
- `Fraction(0, 1)`
- `[]`
- `{}`
- `()`
- `,`
- `b''`
- `set()`
- `range(0)`

More Poll Questions

Poll Question:

What does `test(7)` return?

```
1 def test(num):  
2     if num > 0:  
3         return True  
4     return False
```

- ☐ A True
- ☐ B False
- ☐ C First True then False.
- ☐ D The tuple (True, False)

Poll Question: Printing with Bools

What does the following segment of code produce?

```
1 print("George") and print("Boole")
```

- ☐ A George
- ☐ B Boole
- ☐ C George
Boole
- ☐ D SyntaxError

Short Circuit

Short Circuiting

- Python is **lazy** (for efficiency reasons)
- It won't evaluate Boolean expressions it doesn't need to

```
1 True or anything() # This is True
2 False and anything() # This is False
```

- Python won't evaluate the `anything()` part.
- You can use this to prevent errors from occurring in your code or having to next if statements:

```
1 if (len(my_str) > 10) and (my_str[10] == 'a'):
2     print("the tenth character of my string is ", my_str[10])
```

Poll Question: Multi-way Branches

If you were choosing between 6 possibilities, what is the fewest `elif` statements you could have?

- ☐ A 1
- ☐ B 2
- ☐ C 3
- ☐ D 4
- ☐ E 5

Poll Question: Multi-way Branches

If you were choosing between 6 possibilities, what is the fewest `elif` statements you could have?

- ☐ A 1
- ☐ B 2
- ☐ C 3
- ☐ D 4
- ☐ E 5

```
1 if <cond>:  
2     ...  
3 elif <cond>:  
4     ...  
5 elif <cond>:  
6     ...  
7 elif <cond>:  
8     ...  
9 elif <cond>:  
10    ...  
11 else:  
12    ...  
13
```

Poll Question: Nesting

What does the code on the right print?

- ☐ A 2
- ☐ B 5
- ☐ C 8
- ☐ D `SyntaxError`

Poll Question: Nesting

What does the code on the right print?

- ☐ A 2
- ☐ B 5
- ☐ C 8
- ☐ D SyntaxError

```
1 x = 2
2 if x < 8:
3     if x > 5:
4         print(8)
5     else:
6         print(5)
7 else:
8     print(2)
```

Code Blocks

Code Blocks

- Fancy term for defining a unit of execution.

```
1 model = input('Enter car model: ')
2 year = int(input('Enter year of car manufacture: '))
3
4 antique = False
5 domestic = False
6
7 if year < 1970:
8     antique = True
9
10 if model in ['Ford', 'Chevrolet', 'Dodge']:
11     domestic = True
12
13 if antique:
14     if domestic:
15         print('My own model-T still runs like a charm...')
```

Conditional Expressions

Conditional Expressions vs if-else

- Follows this template: `x if <cond> else y`
- Useful for item assignment where a condition must be met in order to avoid errors
- More concise

```

1 x = input()
2 if len(x) > 9:
3     y = x[9]
4 else:
5     y = None

```

```

1 x = input()
2 y = x[9] if len(x) > 9 else
   None

```