Programming with Python

Lesson 2: Conditionals and Loops

November 8th, 2016

Last week's goals

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helloworld.py

```
print("Welcome to our number adder!!")
print("Please input a number.")

input1 = int(input())

print("Please input another number.")

input2 = int(input())

output = input1 + input2

print(str(input1) + " + " + str(input2) + " = " + str(output))
```

Problems with our calculator

What is wrong with our calculator right now?

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We are going to soup up our calculator to fix all these bugs!

What's a conditional? What's a boolean?

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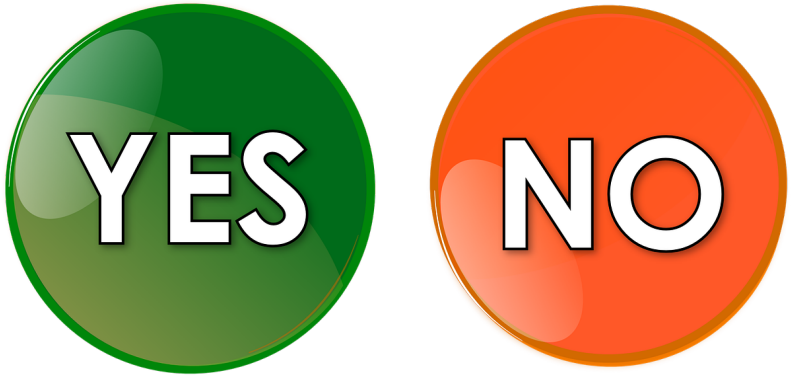

Figure: image curtosy of ArtsyBee from http://pixabay.com

Boolean type & operators

Boolean can be one of two values in Python:

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- True
- False

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$<=$: Less than or equal to

$==$: Equal to

Boolean type & operators

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- True
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There are also a bunch of operators to compare booleans

$>$: Greater than

$>=$: Greater than or equal to

$<$: Less than

$<=$: Less than or equal to

$==$: Equal to

$!=$: Not equal to

Some examples

Some examples

$4 == 3?$

Some examples

$4 == 3$?

False

Some examples

$4 == 3$? False

$4 >= 3$?

Some examples

$4 == 3$?	False
$4 >= 3$?	True

Some examples

$4 == 3$?	False
$4 >= 3$?	True
$4 ==$ "Hello World!"?	

Some examples

$4 == 3$?	False
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True != True?	False
$4 == (4 == 4)$?	

Some examples

$4 == 3$?	False
$4 >= 3$?	True
$4 ==$ "Hello World!"?	False
True != True?	False
$4 == (4 == 4)$?	False... why?

MORE boolean operators

MORE boolean operators

and : And

MORE boolean operators

and : And

or : Or

MORE boolean operators

and : And

or : Or

! : Negate

More examples

More examples

$(4 == 3)$ or $(4 == 4)$?

More examples

$(4 == 3)$ or $(4 == 4)$? True

More examples

$(4 == 3)$ or $(4 == 4)$? True

$(\text{"Casper"} \mathrel{!}= \text{"Is Cool"})$ and $(\text{"Jonathan"} \mathrel{!}= \text{"Is Cool"})$

More examples

$(4 == 3)$ or $(4 == 4)$? True

("Casper" != "Is Cool") and ("Jonathan" != "Is Cool")
True

More examples

(4 == 3) or (4 == 4)? True

("Casper" != "Is Cool") and ("Jonathan" != "Is Cool")
True

3 == 3 and (not ("testing" == "testing" or "Python" == "Fun"))

More examples

(4 == 3) or (4 == 4)? True

("Casper" != "Is Cool") and ("Jonathan" != "Is Cool")
True

3 == 3 and (not ("testing" == "testing" or "Python" == "Fun")) False

The 'if' statement

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1. if(BOOLEAN):
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   thing
2. if(BOOLEAN):
   thing
   else:
   other thing
3. if(BOOLEAN):
   thing
   elif(BOOLEAN):
   other thing
   else:
   Yet another other thing

For example...

```
myNumber = 50;


if(myNumber == 4):
    print('Casper is gr8 at Python')
elif((myNumber-47) != 3):
    print('Casper is alright at Python')
else:
    print('Casper is downright terrible at python')
```

For example...

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myNumber = 50;


if(myNumber == 4):
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elif((myNumber-47) != 3):
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```

Can anyone guess what it says?

Back to the calculator

How can we extend our calculator to add, subtract, divide and multiply?

Back to the calculator

How can we extend our calculator to add, subtract, divide and multiply? Time for some live coding!

Our calculator is beginning to take shape!

Our calculator is beginning to take shape! However, what can go wrong with our calculator?

Our calculator is beginning to take shape! However, what can go wrong with our calculator? How can we deal with our errors?

Handling our errors

More live coding!

Our calculator just gets better and better

What now?

Our calculator just gets better and better

What now?
Lets make sure the user enters the correct operation, without having to restart the program!

Looping

What are loops?

Looping

What are loops? What different kind of loops are there?

The while loop

```
while(BOOLEAN):
    something
    something else
```

An example

```
x = 0
while(x<10):
    print("Wow, " + str(x) + " is a great number!")
    x = x + 1
print("All finished. The final value if x is: " + str(x))
```

An example

```
Wow, 0 is a great number!
Wow, 1 is a great number!
Wow, 2 is a great number!
Wow, 3 is a great number!
Wow, 4 is a great number!
Wow, 5 is a great number!
Wow, 6 is a great number!
Wow, 7 is a great number!
Wow, 8 is a great number!
Wow, 9 is a great number!
All finished. The final value if x is: 10
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An example

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All finished. The final value if x is: 10
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What would happen without the $x = x + 1$ line?

An example

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Wow, 4 is a great number!
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Wow, 6 is a great number!
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Wow, 8 is a great number!
Wow, 9 is a great number!
All finished. The final value if x is: 10
```

What would happen without the $x = x + 1$ line?
What would happen if the $x = x + 1$ line was before the print?

Yet more live coding!

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However, we still have to re-run the program every time we want to do another calculation.

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However, we still have to re-run the program every time we want to do another calculation.
What can we do about this?

A final little bit more of live coding!

That's all for tonight

To summarise:

- We have learnt about conditionals
- We have used conditionals to make our calculator be able to add, subtract, divide or multiply
- We have used conditionals to handle errors
- We have learnt about loops and used them to make our program much more usable

For next week

Source code plus lecture slides will be available online soon after the lesson.
If you are new to HackSocNotts, please join us on *http://hacksocnotts.slack.com*.
If you have any questions, feel free to ask now or over slack.