Why Does My Computer Do That? Intro to Coding with Python– Conditionals

Dr. Ab Mosca (they/them)

Slides based off slides courtesy of Jordan Crouser (https://jcrouser.github.io/)

Plan for Today

- Recap exercise from last class
- Intro to conditionals

15-minute exercise: dollars and cents

Use **built-in functions** and functions from the **`math` module** to take 3 prices, calculate their sum, and output their total formatted like this:

```
Console   Shell
Enter first price: 1.23
Enter second price: 2.45
Enter third price: 1.43
Total is:  5  dollars and  11  cents.
>
```

RECAP

How is information represented using **electricity**?

RECAP

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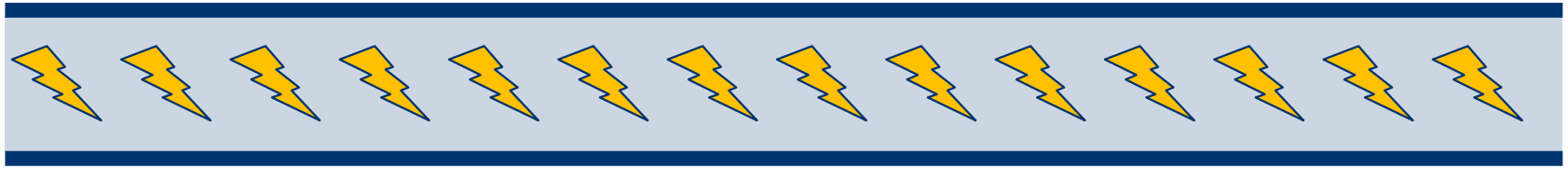
One wire: a "bit"

"off"



"on"

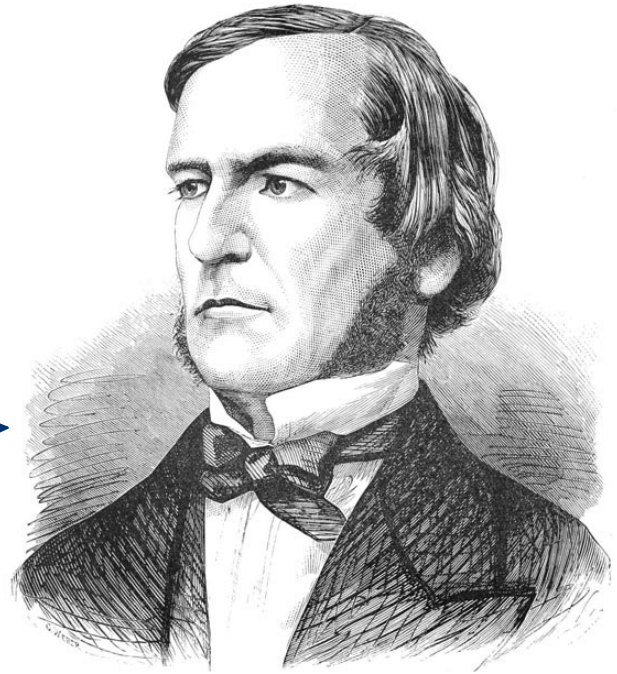
Bits and booleans

- **Bits**: 0 and 1
- **Boolean values**: `True` and `False`
- **Boolean switches**: imagine a world where every decision has a binary choice:

Go out or **stay in**?

Walk or **take the car**?

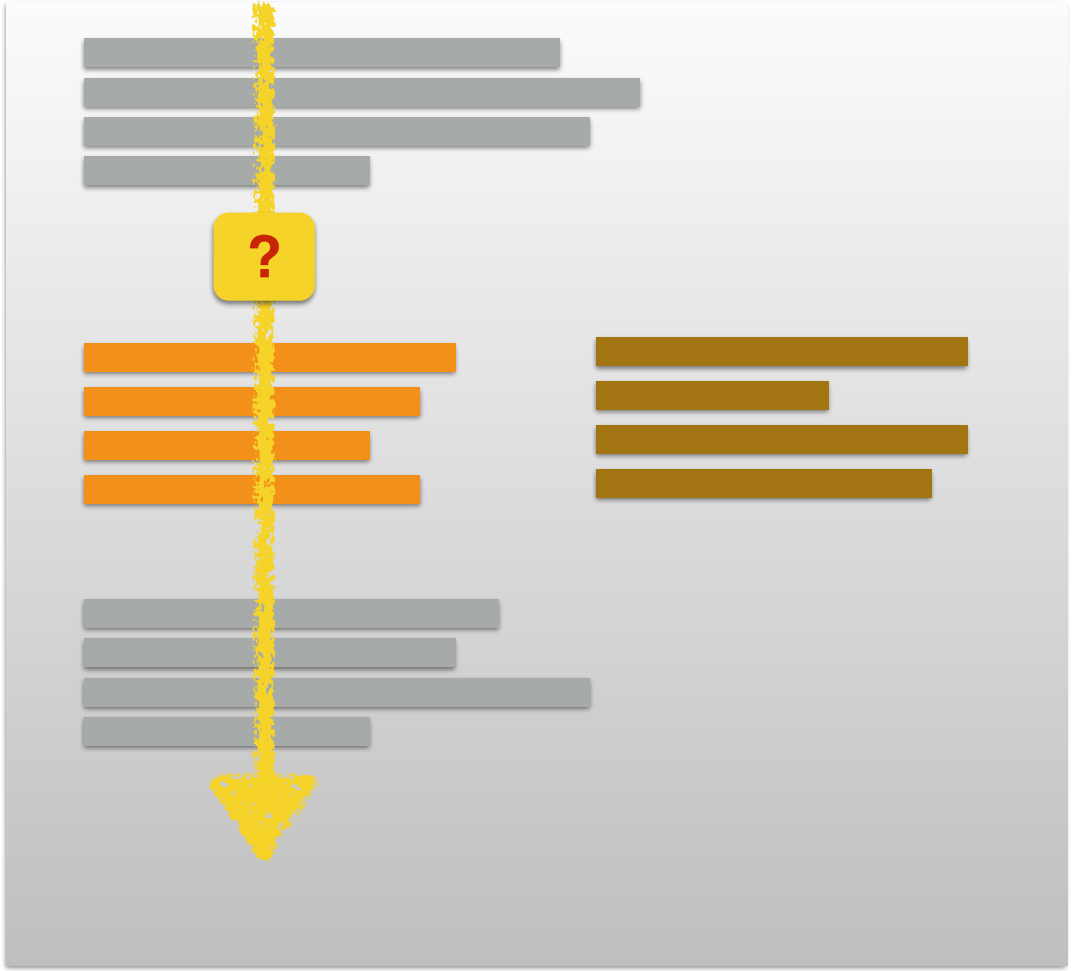
Cats or **Dogs**?



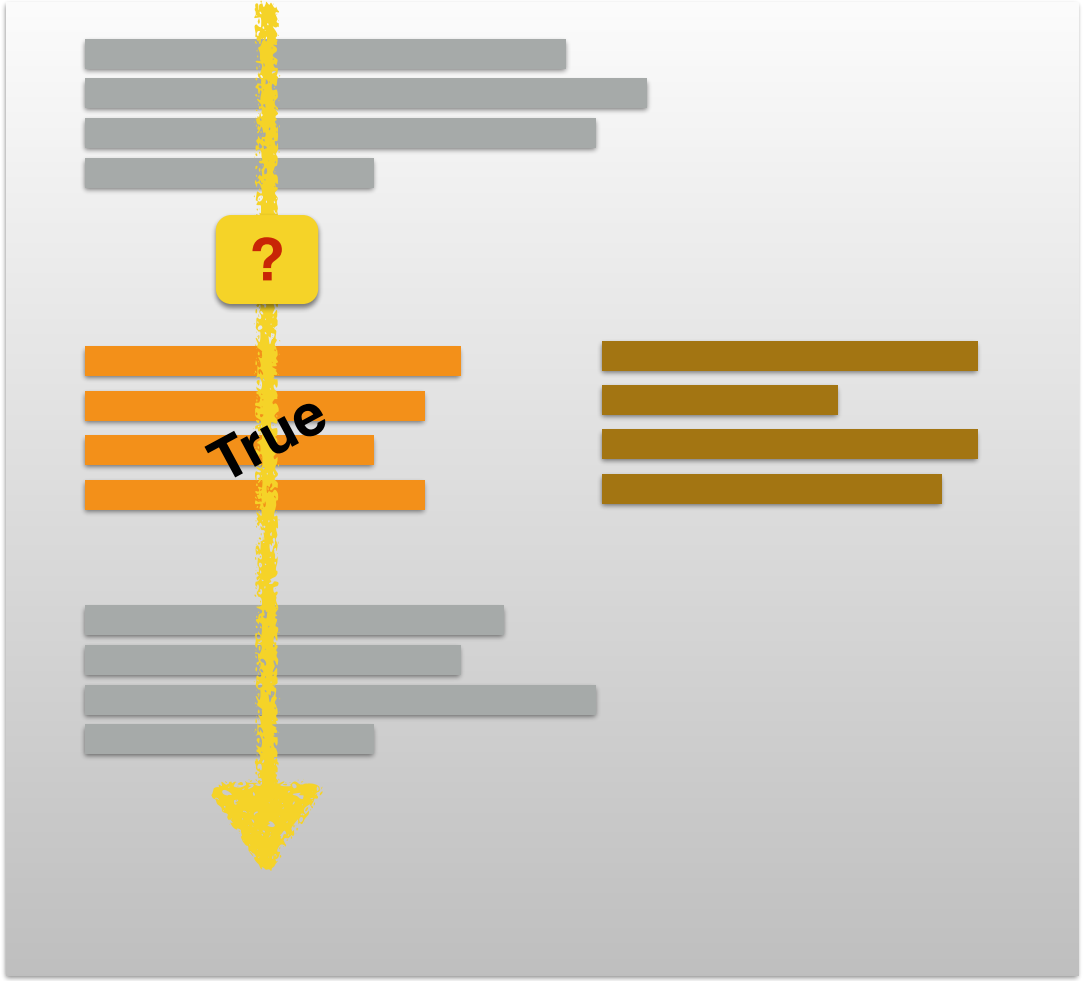
George Boole
1815 - 1864

So far: linear programs

What if we need to make a **choice**?



Booleans to the rescue!



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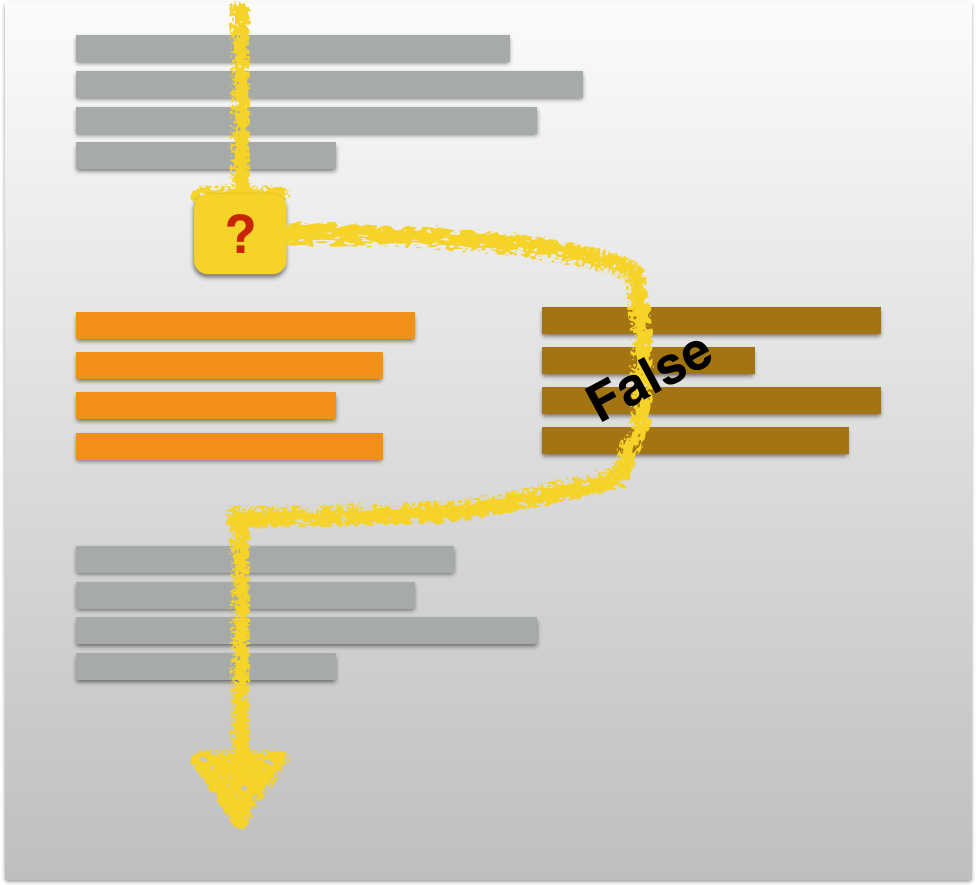
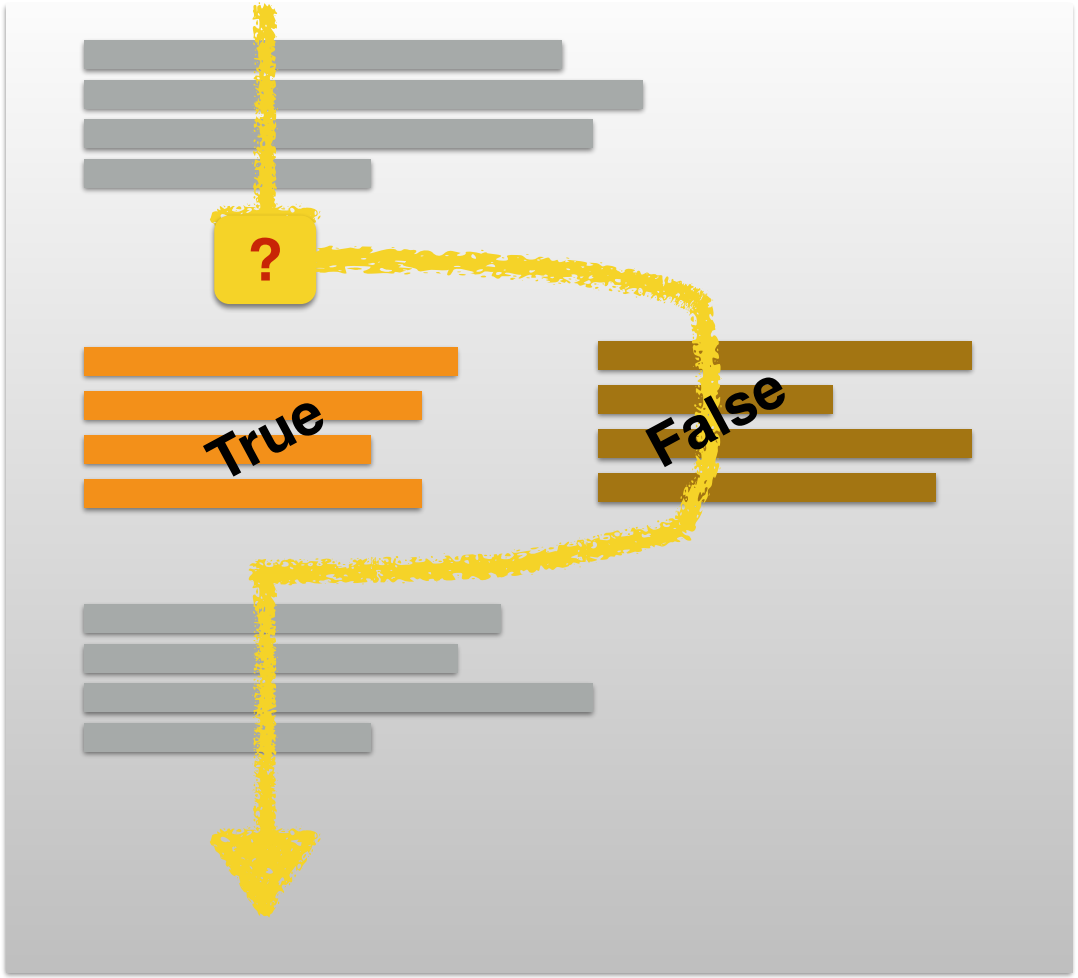
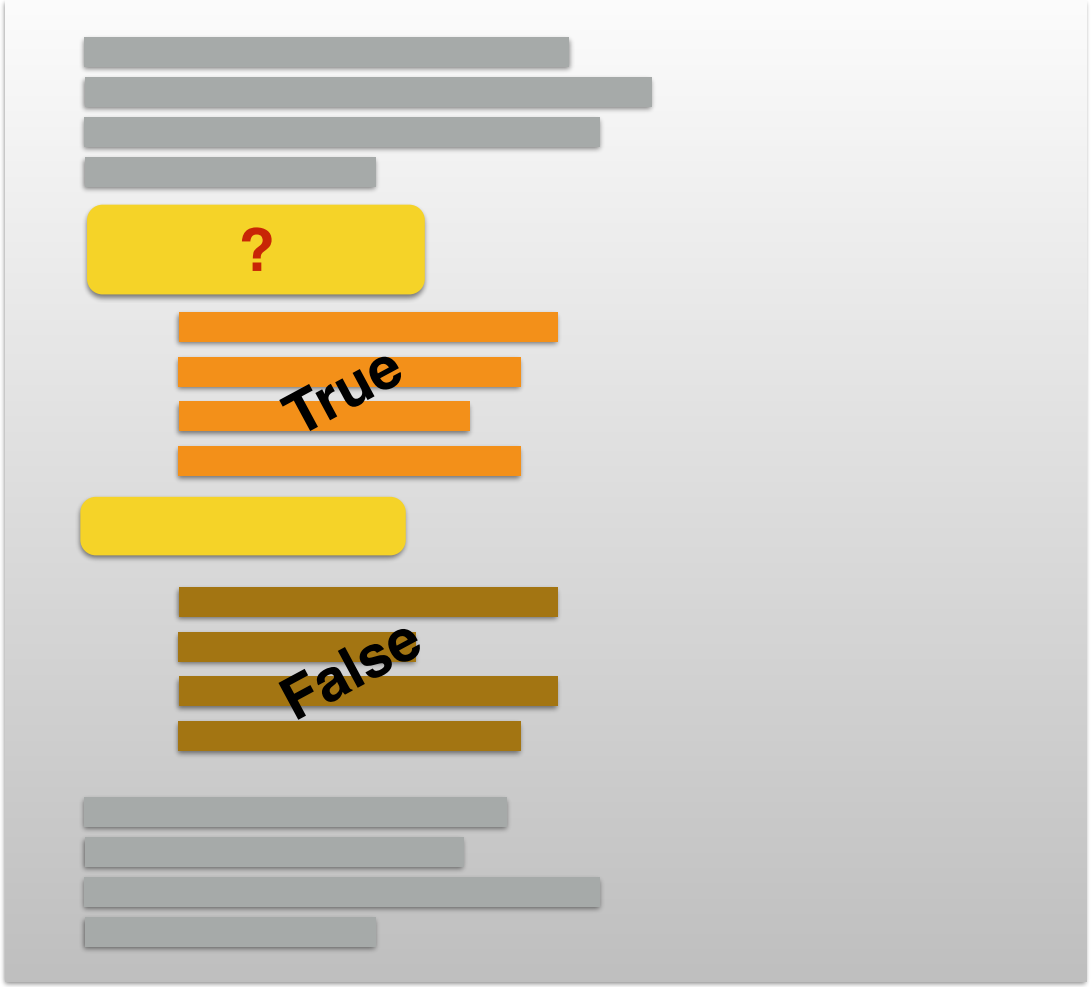


Just one **problem**: how do we write it?



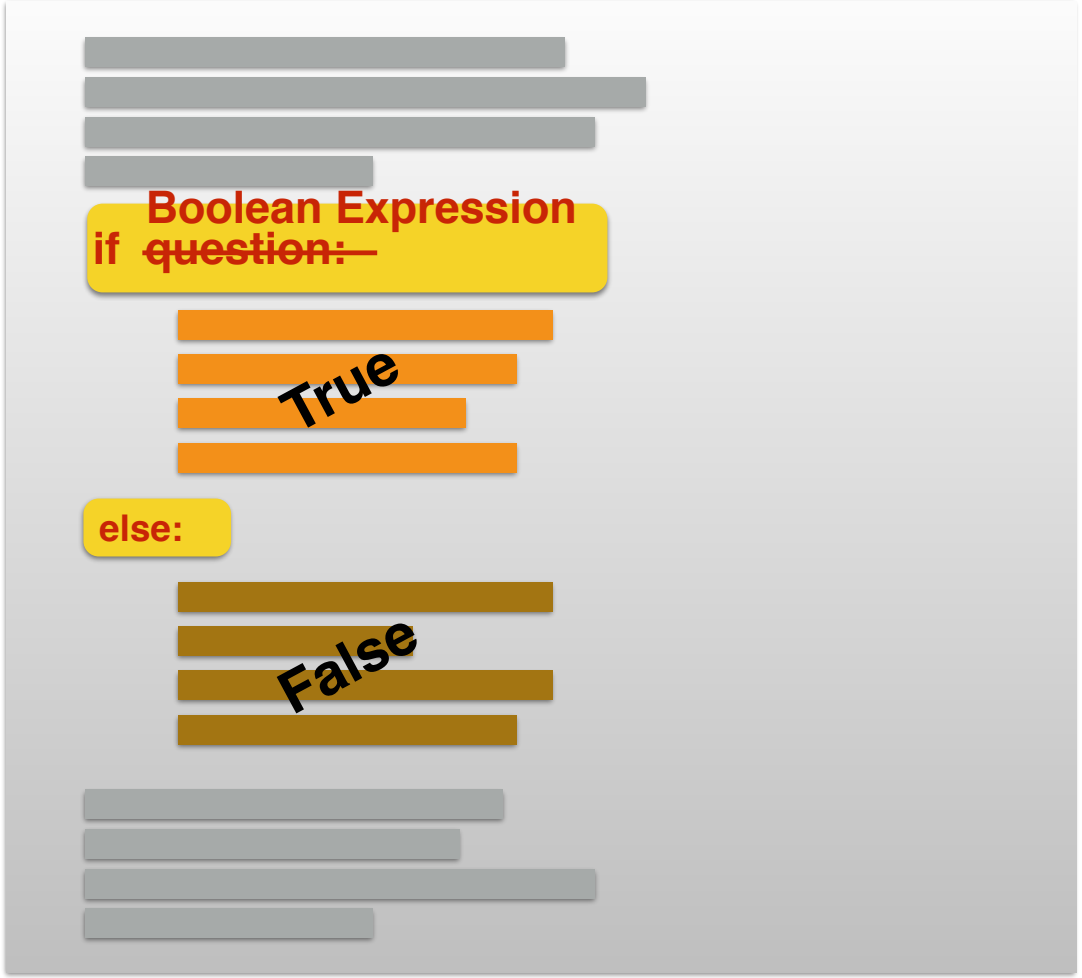
We can only type **one line** at a time…



What we **want** to say

```
if  answer to question is True:
        True
else:
        False
```

What we have to **work with**



Real life examples (pseudocode)

```
if (today is a weekday):
      go to class
else: # (today is a weekend)
      sleep in
```

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if (today is a weekday):
      go to class
else: # (today is a weekend)
      sleep in

if (food at dining hall looks good):
      eat at dining hall
else: # food at dining hall doesn't look good
      order Domino's
```

Real life example (change machine)

How many 20s to get to total amount of dollars?

```
Ex. User inputs $71
    Output should be 3 $20-bills
Ex. User inputs $21
    Output should be 1 $20-bill
Ex. User inputs $5
    Output should be 0 $20-bills
```

print the ”s” only if necessary

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What is the if-else statement for this in pseudo code?

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Ex. User inputs $21

Output should be 1 $20-bill

print the ”s” only if necessary

Ex. User inputs $5

Output should be 0 $20-bills

print the ”s” only if necessary

```
if (only one 20):
   output message has no s
else: #multiple or no 20s’
   output message has s
```

Real life example (change machine)

Untitled

```
if (num20s == 1):
    print(num20s, "$20-bill")
else:
    print(num20s, "$20-bills")
```

Ln: 4 Col: 30

Relational operators

Operator	Meaning
==	equal to
!=	not equal to
<	less than
<=	less than or equal to
>	greater than
>=	greater than or equal to

these come in handy when constructing **boolean statements**

Demo – Open a repl to follow along

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==	equal to
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Multiple conditions

```
if (it is sunny):
      go to the beach
if (it is snowy):
      go skiing
else:
      stay home
```

Sequential `if` statements are **independent**

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this line will **always** run

this block will **only** run if it is sunny

Sequential `if` statements are **independent**

```
if (it is sunny):
    go to the beach
if (it is snowy):
    go skiing
else:
    stay home
```

this line will **always** run

this block will **only** run if it is sunny

this line will **always** run

this block will **only** run if it is snowy

The **else** refers only to the **nearest if**

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if (it is sunny):
    go to the beach
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    go skiing
else:
    stay home
```

this line will **always** run

this block will **only** run if it is sunny

this line will **always** run

this block will **only** run if it is snowy

this block will **only** run if it is not snowy

To chain multiple "checks" together: **elif**

evaluated in order

```
if (it is sunny):
      go to the beach
elif (it is snowy):
      go skiing
else: # it is neither sunny nor snowy
      stay home
```

To chain multiple "checks" together: **`elif`**


```
if (it is sunny):
      go to the beach
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this line will **always** run

this block will **only** run if it is sunny

this line will **only** run if it is not sunny

this block will **only** run if it is snowy

this block will **only** run if it is neither sunny nor snowy

Remember: order matters!

evaluated in order

```
if (it is sunny): # regardless of snow
      go to the beach
elif (it is snowy): # but not sunny
      go skiing
else: # it is neither sunny nor snowy
      stay home
```

Remember: order matters!

evaluated in order

```
if (it is snowy): # regardless of sun
      go skiing
elif (it is sunny): # but not snowy
      go to the beach
else: # it is neither sunny nor snowy
      stay home
```

Nested conditions

```
if (class is cancelled):
    if (you have homework):
        work on homework
    else: # class cancelled, no HW
        binge-watch Netflix
```

Simultaneous conditions

```
if (it's Friday and it's 4pm):
      go to tea


if (you're hungry or you're bored):
      go to the CC
```

Work with someone near you to

(1) write a (tiny!) program that uses chained conditionals

    if-elif-else

(2) write a (tiny!) program that uses a nested conditional

    if

        if-else

(3) write a (tiny!) program that uses simultaneous conditions

    if __ and __

    if __ or __