Administrivia
Homework #2 is due Wed Oct 19.
Labs this Friday.
Functions

- A small program (block of code) we can run within Python.
  - Saves us from rewriting code
  - Don’t reinvent the wheel!
- Analogy: Functions are more verbs.
- Also called subroutine or procedure.
When we want to execute a function, we call or invoke it.

Use name of the function with parentheses.

- `print()`

Many functions come built-in to Python or in the standard library.

Others we will compose at need.
input is a built-in function.
Argument: string prompting user
Return value: input from user (as str)
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Is `float("%i" % 10))` a legal expression?
A program should achieve a goal.
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Let’s implement the quadratic equation.
Example: Quadratic equation

```
print( "QUADRATIC SOLVER" )
print( "a x^2 + b x + c = 0" )

a = float( input( 'a: ' ) )
b = float( input( 'b: ' ) )
c = float( input( 'c: ' ) )

root = ( b**2 - 4*a*c ) ** 0.5
denom = 2 * a
pos = (-b + root) / denom
neg = (-b - root) / denom
message1 = "%.2f + %.2fi" % (pos.real,pos.imag)
message2 = "%.2f + %.2fi" % (neg.real,neg.imag)
print("Solution 1: %s" % message1)
print("Solution 2: %s" % message2)
```
Achievement unlocked!

Achievement unlocked
Write a program.
Methods
Like attributes, functions can be stored inside a type as well.
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Use attribute operator on the value.
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"STOP SHOUTING!".lower()
(1 + 1j).conjugate()
Methods

- Like attributes, functions can be stored inside a type as well.
- Use attribute operator on the value.
  "STOP SHOUTING!".lower()
  (1 + 1j).conjugate()
- Value is treated like an argument.
"GATTACA".count('A')
"MVEMJSUN".find('J')
"ABACADABRA".replace('AB','G')
' FNORD '.strip()
'high king of narnia'.title()
'wEiRd'.swapcase()
s = "WATER MAIN"
x = s[0:s.find(' ')].lower()
x = x.title().swapcase()

What is the value of x?
A 'wATER'
B 'Water'
C 'wATE'
D 'aTER'
Comments
We can explain our code using comments.

```python
dx = 0.01  # grid spacing, m
V = 14.2  # voltage, V

""
This is an extended comment. I can be many lines long. Use me to explain functions or formulae, to document code, or to temporarily hide blocks you don't want to run.
""
```
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- Long comments can also be stored as triple-quoted strings.
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