

Objectives

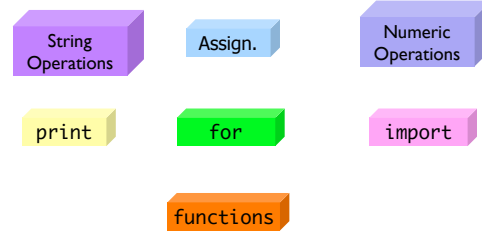
- Advanced problem solving with **for** loops

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Labs: Building New Solutions from Building Blocks



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More on C→F Temperature Conversion

- $-7^{\circ}\text{C} \rightarrow ^{\circ}\text{F} = -44.6^{\circ}\text{F}$
 - My sister said, "I understood that I had input 'the opposite of 7°C ', which is 'the opposite of 44.6°F '."
- So today I tried this: $(-7)^{\circ}\text{C} \rightarrow ^{\circ}\text{F} = 19.4^{\circ}\text{F}$
 - My sister said, "I was just surprised that negating is a function that normally comes after the conversion."

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for loop review

```
for i in xrange(5):  
    # like assigning i values(0,1,2,3,4)  
  
    # rest of loop body ...
```

- Note: when have `xrange(5)`
 - `i` gets values (0, 1, 2, 3, 4)
 - Which means that loop executes 5 times
- Optional: start and step parameters

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Practicing for Loops

- Print the following:

➤ A) 1 2 3 4 5

➤ B) 2 5 8 11

➤ C) ****

What is getting repeated?
How many times?

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Practice: Assign Students to Groups

- Using a **for** loop and the modulo (%) operator, assign students to groups
 - How would you "model" students (given the above problem specification)?

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Practice: Assign Students to Groups

- Using a **for** loop and the modulo (%) operator, assign students to groups
 - How would you “model” students (given the above problem specification)?
- Output for five students in 3 groups:

```
Student 0 is in group 1
Student 1 is in group 2
Student 2 is in group 3
Student 3 is in group 1
Student 4 is in group 2
```

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Practice: Assign Students to Groups

- Using a **for** loop and the modulo (%) operator, assign students to groups
 - How would you “model” students (given the above problem specification)?

```
numStudents = 12
numGroups = 4
for student in xrange(numStudents):
    whichGroup = (student % numGroups) + 1
    print student, "is in group", whichGroup
```

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Practicing for Loops

- Print the following:

```
1 2 3 4 5
1 2 3 4 5
1 2 3 4 5
```

What is getting repeated?
How many times?

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Nested for Loops

- Use when need to repeat a loop
 - Good programming practice: use different variables for inner and outer loop variable

```
for x in xrange(N):           Outer loop
    statementa
    for y in xrange(M):       Inner loop
        statementb
```

- Analysis: how many times are **statementa** and **statementb** repeated?

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nested_for.py 10

Fence Post Problem

- Given some posts and some beams to connect the posts, build a fence that is X fenceposts long

Posts: |
Beams: -

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fence_post.py 11

Practice: Draw a Tic-Tac-Toe Board

```
| |
- - -
| |
- - -
| |
```

What is getting repeated?
How many times?

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tictactoe.py 12

RANDOM MODULE

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random module

- Python provides the **random** module to generate pseudo-random numbers
- Why “pseudo-random”?
 - Actually generates a list of random numbers and grabs the next one off the list
 - A “seed” is used to initialize the random number generator, which decides which list to use
 - By default, the current time is used as the seed

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Some random Functions

- **random()**
 - Returns the next random floating point number in the range [0.0, 1.0)
- **randint(a, b)**
 - Return a random integer N such that $a \leq N \leq b$

```
import random
#random.seed(1)      # module.function()
for x in xrange(10):
    print random.random()
```

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random_test.py 15

VA Lottery: Pick 4

- To play: you pick 4 numbers between 0 and 9
- To win: select the numbers that are selected by the magic ping-pong ball machine
- Your job: Simulate the magic ping-pong ball machines
 - Display the number on one line

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For Friday

- Lab 2 is due
- Read “What is IBM's Watson?” and write summary on Sakai

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