Modules (turtles, math, random)

COSC 101, 2018-02-07

Announcements
● Sign-up for a peer-led workshop
● Homework #1 due tomorrow @ 11pm

Outline
● Warm-up
● Modules
● Turtle graphics
● Programming practice

Warm-up
Write a program that asks for yesterday's and today's high temperatures and outputs 'Today is warmer', 'Today is colder', or 'Today is the same'.

```python
yesterday = float(input("Yesterday's high temperature: "))
today = float(input("Today's high temperature: "))
if today > yesterday:
    print("Today is warmer")
elif today < yesterday:
    print("Today is colder")
else:
    print("Today is the same")
```

Modules
● What is a module? --- a file containing functions, variables, and classes (i.e., new types of objects) that are intended for use in other Python programs
● What are some examples of modules you might use? --- math, random, turtles
● What do you need to include in your program if you want to use a module? --- an import statement
● How do you use something contained in an imported module? --- using the module name, dot (.), and the name of the thing you want to use, e.g., math.pi

Turtle Graphics
● Useful for illustrating computational thinking --- remember our drawing exercise from the first week
● What do you need to do before you can draw with a turtle?
  o Import the module --- import turtle
  o Create a graphics window --- window = turtle.Screen()
  o Create a Turtle object --- bowser = turtle.Turtle()
● Useful Turtle functions
  o forward --- move forward by the specified number of steps
  o left --- turn to the left by the specified number of degrees
  o right --- turn to the right by the specified number of degrees
  o up --- stop drawing
  o down --- resume drawing
Programming Practice

- Write your own TSA pseudo-randomizer app. (YouTube video)
- Write a program that asks for the number of sides on a die and “rolls” the die.
- Write a program that asks for a circle’s radius and computes the circle’s area and circumference.
- Write a program that asks for the length of the sides of a right triangle and draws the corresponding triangle. Hint: You’ll need to use Pythagorean theorem \((a^2 + b^2 = c^2)\) and the law of sines \(\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}\).
- Write a program that asks for a number between 0 and 3 (inclusive) and draws the corresponding number as it would appear on a simple digital clock.
- Each person in the group should create a drawing composed only of straight lines. As a group, choose one of the drawings and write a program that recreates the drawing.
- Write a program that asks for a username and password. If the input matches one of the combinations below, then the program should print ‘Login successful’; otherwise it should print ‘Access denied’.

<table>
<thead>
<tr>
<th>Username</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>alice</td>
<td>colgate</td>
</tr>
<tr>
<td>bob</td>
<td>hamilton</td>
</tr>
<tr>
<td>carlos</td>
<td>python</td>
</tr>
</tbody>
</table>
- Write a program that tells someone whether they should take the standard deduction ($6,350 for single) on their federal taxes. Your program should ask the user about each of the following possible itemized deductions:
  - State sales tax --- use the NY state sales tax rate (4%)
  - Charitable contributions
  - Moving expenses to a first job --- if you move more than 50 miles, you can deduct 23¢ per mile
  - State tax paid the previous year