LE/EECS 1015 (Section A: LAB 04) Week 6: Lab #5

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Goals of Lab 5

1. Familiarization with local and global variables.

2. Function scoping

3. Function chaining

4. Test Writing

Concept Review

1. Local & Global Variables (Review)
2. Modules
   - math
   - random
3. Functions
   - Position Arguments
   - Keyword Arguments
   - Default Arguments
4. Examples

Modules (Libraries)

- Python has an abundance of modules that support various tasks
- Modules are a collection of **reusable** methods (functions) and constants
- You can install modules through pip
- You can define your own modules

Modules

Example Modules

- **math**
  - Functions
    - $ceil, floor$
    - sin, cos, tan
    - $degrees, radians$
    - $exp, exp2, factorial, log, log10, pow, sqrt$
  - Constants
    - e, inf, pi
- **random**
  - Functions
    - $normalvariate, randint, randrange, random, uniform$

Math Module

1. math.ceil(x, /) $\rightarrow$ Returns the ceiling of x as an Integral. In short, it rounds the number up to the nearest integer.
2. math.floor(x, /) $\rightarrow$ Returns the floor of x as an Integral. In short, it rounds down to the nearest integer.
3. math.sin(x, /) $\rightarrow$ Returns the sine of x **(Measured in Radians)**
4. math.cos(x, /) $\rightarrow$ Returns the cosine of x **(Measured in Radians)**
5. math.tan(x, /) $\rightarrow$ Returns the tangent of x **(Measured in Radians)**
6. math.degrees(x, /) $\rightarrow$ Converts angle x from radians to degrees.
7. math.radians(x, /) $\rightarrow$ Converts angle x from degrees to radians.
8. math.exp(x, /) $\rightarrow$ Returns e^x
9. math.exp2(x, /) $\rightarrow$ Returns 2^x
10. math.factorial(x, /) $\rightarrow$ Returns $n!$ if and only if $x \geq 0$ and `type(x) == int`
11. math.log(x, b) $\rightarrow$ Returns $\log_b(x)$
12. math.log10(x, /) $\rightarrow$ Returns $\log_{10}(x)$
13. math.pow(x, y, /) $\rightarrow$ Returns $x^y \equiv x * *y$
14. math.sqrt(x, /) $\rightarrow$ Returns $\sqrt{x}$

Random Module

Functions

1. random.normalvariate(mu=0.0, sigma=1.0) $\rightarrow$ Returns a random float which is sampled from a Normal Distribution.
2. random.randint(a, b) $\rightarrow$ Returns a random integer $r \in [a, b]$
3. random.randrange(start, stop=None, step=1) $\rightarrow$ Chooses a random item from $[start, stop - 1]$, given a step value.
4. random.random() $\rightarrow$ Returns $x \in [0, 1)$.
5. random.uniform(a, b) $\rightarrow$ Gets a random number in the range $[a, b)$ or $[a, b]$ depending on the rounding.

Functions Revisited

- Positional arguments are passed to the function in the order in which they are defined

- Keyword arguments are passed to the function using the names of parameters.

- Default arguments are already assigned in the method signature.

Challenge

1. Write a function $roll\_doubles() \rightarrow bool$ which simulates rolling two six-sided dice. If the two dice have the same face, return True. Else, return False.

2. Write a function $generate\_sine\_table() \rightarrow None$ that generates the values of $\sin(x°)$ for $-180° \leq x \leq 180°$. The values should increment with a step size of 90°.

Lab 5 – Objectives

1. Task 1: Follow the Steps (/30)
2. Task 2: Debugging (/30)
3. Task 3: Implementation: Revenue (/10)
4. Task 4: Implementation: Food (/10)
5. Task 5: Implementation: Abs Val (/10)
6. Task 6: Implementation: Even Number (/10)

Thank You!

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