CLASS 05
FUNCTIONS & THE MATH MODULE

COMP 130 – INTRODUCTION TO COMPUTING

DICKINSON COLLEGE

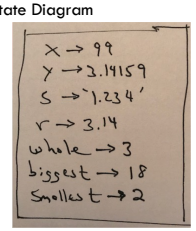
FUNCTIONS

- A ***function*** is a named sequence of statements that performs a computation.
  - a.k.a method / procedure / sub-routine
- Some Python Built in Functions:
  - `type(3)`
  - `x=int('17')`
  - A Function:
    - **Accepts** values as ***arguments*** (e.g. 3 or `'17'`)
      - Enclosed in parenthesis.
    - ***Returns a value*** as a result (e.g. `int` or 17)
      - Can be used like any other value. (e.g. in expressions and assignments statements.)

BUILT-IN FUNCTIONS

- Python provides many built-in functions
  - `x=int('99')`
  - `y=float('3.14159')`
  - `s=str(1.234)`
  - `r=round(y,2)`
  - `whole=round(y)`
  - `biggest=max(2, 7, 3, 18, 4)`
  - `smallest=min(2, 7, 3, 18, 4, 27)`

State Diagram



MODULES

- A Python ***module*** is a collection of related functions, variables and/or classes/objects.
  - Examples:
    - *math*: functions and variables for common mathematical operations.
    - *random*: provides functions for generating random numbers.
    - Lots and lots and lots of others…

MATH MODULE EXAMPLE

```
import math

side_a=5
side_b=7
hypotenuse=math.sqrt(side_a**2 + side_b**2)
print(hypotenuse)

radius=3.5
area=math.pi * radius**2
print(area)
```

- To Use a Module
  - Import the module
  - Use *dot notation:*
    - `module.method(…)`
    - `module.variable`
    - *E.g.*
      - `math.sqrt(25)`
      - `math.pi`

APPLICATION PROGRAMMING INTERFACE (API) DOCUMENTATION

- An ***Application Programming Interface (API)*** is the collection of functions a programmer uses to interact with a code library (e.g. a module)
- ***API Documentation*** describes the functions, variables, classes and objects contained in a library.
  - math module as an example
    - Simplified: https://www.programiz.com/python-programming/modules/math
    - Definitive: https://docs.python.org/3/library/math.html