**CSCI 1470.3 Classroom Notes and Demonstrations**

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<https://docs.python.org/3/library/turtle.html>

Form a habit to read the manuals.

**Python Resources**

by K. Yue

**1. Python's Manual**

* Version 3.13: (navigate to your version).
  + Manual: <http://docs.python.org/3.13/reference/index.html>
  + Python Interpreter tutorial: <https://docs.python.org/3.13/tutorial/interpreter.html>
  + Standard library: [https://docs.python.org/3.13/library/index.html](http://docs.python.org/3.13/reference/index.html)

**2. Python Books (Free)**

1. A Byte of Python: <https://homepages.uc.edu/~becktl/byte_of_python.pdf>. Free download, good coverage of topics in this class.
2. Think Python: How to Think Like a Computer Scientist, version 3: <https://allendowney.github.io/ThinkPython/>. Include computational thinking.
3. Python for everyone: <https://www.py4e.com/>. Free, good, sometimes with videos, but may contain too much information for this class.

**3. Learning Tutorials and Materials**

1. Tutorial at w3shools: <https://www.w3schools.com/python/>. Plenty of examples. Good for beginners and this class.
2. <https://www.learnpython.org/>: popular, but w3schools is better. Beware of ads.
3. <https://www.programiz.com/python-programming>: also contains some advanced topic.
4. Google has a tutorial on Python: <https://developers.google.com/edu/python>. However, it is more for somewhat experienced programmers.
5. For experienced programmers: <https://learnxinyminutes.com/docs/python3/>: one of my favorites.

**4. Online Python's interpreter or IDE**

* There are many possible advantages of online Python tools: convenience, accessibility, lightweight, collaboration, etc.
* There are also many possible disadvantages: restrictions, limited features, security and privacy, etc.
* Some online Python interpreters:
  + <https://www.online-python.com/>
  + <https://www.programiz.com/python-programming/online-compiler/>
  + <https://www.w3schools.com/python/python_compiler.asp>
* This course does not recommend the use of online Python IDE.

**5. Cheat Sheets**

* If you like cheat sheet types of examples and summary:
  + <https://scouv.lisn.upsaclay.fr/python-memento/memento-python3-en-latest.pdf>: basic and short.
  + <https://github.com/ehmatthes/pcc_3e/releases/download/v1.0.0/beginners_python_cheat_sheet_pcc_all.pdf>: much longer.

Python code can be put together into modules

**Python IDLE**

by K. Yue

**1. Python IDLE**

* Python IDLE is bundled in the Python distribution. There is no need for separate installation.
* IDLE can be regarded as a very simple Integrated Development Environment (IDE). It is used in this class.

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* A short IDLE tutorial: <https://www.youtube.com/watch?v=WIlQukiXs-E>. (a little dated)
* <https://realpython.com/python-idle/> is a very good tutorial on IDLE. However, it contains many topics not needed in this class.

**2. Running IDLE shell as interpreter**

* When you start IDLE, a shell window appears.
* IDLE shell is an interactive interpreter with REPL (Read-Evaluate-Print loop)
  + Read a Python statement, single-lined or multiple-lined.
  + Evaluate or execute the statement.
  + Print the result of execution of the statement.
* A shell contains the collection of Python code the user entered interactively.

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**2.1 Logging a shell session**

* Logging is a crucial practice and habit in software development.
* Logging tracks program behavior and problems, enables debugging, supports performance analysis, supports auditing, monitors security and informs users, administrators, and developers.
* IDLE shell session can be logged by saving it in a file.

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A shell session has internal states.

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Restarting shell -> clean up the internal state.

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**Shell Menu**

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* Two buttons you may use:
  1. Restart shell: start a new shell session.
  2. Interrupt Execution: stop the execution (in case you get into an infinite loop)

**3. Python program file editing and execution**

* Shell includes a text editor.
* One can open an existing Python program file, or create anew Python program file.

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Open an existing file, square.py:

Screens screenshot of a computer screen

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Running square.py

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* The file editor has many features.

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* Some features you may use:
  + Use the options menu to show line number.
  + Set and clear breakpoints for debugging.
  + Run the program by using Run->Run Module.

**4. Debugging in IDLE**

* A good tutorial in IDLE: <https://www.cs.uky.edu/~keen/help/debug-tutorial/debug.html>. Contain more than needed in the class.
* To debug a Python program:
  1. Open the Python program using IDLE Shell: File -> Open.
  2. Turn on the Shell debugger: Go->Debugger
  3. Run the program in the editor using Run->Run Module.
  4. Use the debugger window.

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* Some basics:
  1. Use the go button in the debugger window to execute.
  2. Set and clear breakpoint in the editor.
  3. Examine the locals window in the debugger.

When the debugger window is started, in the example below, the locals window shows values of *local variables*.

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An example of using breakpoints:

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