ECS 15

Variables
Outline

- Using IDLE
- Building blocks of programs:
  - Text
  - Numbers
  - Variables!
- Writing a program
- Running the program
Starting up Python

- From START menu, pick “all programs”, then Python
- Pick the “IDLE” option
IDLE

- IDLE is an interpreter
- Can use it like a calculator
- Responds to input line-by-line
Remainder

- 0, 1, 2, 3... and -1, -2, -3,... are **integers**
- 7//3 is integer division
- 7/3 is **floating point division** (diff. in Python 3)
- 7%2 = ?
- % gives the **remainder** when 7 is divided by 2
- (7//2)*2 + (7%2) = 7
Floating point numbers

- 7.0, 2.0, 0.0006, 7.34 – **floating point numbers**
- 7.0/2.0 = 3.5 – **floating point division**
- 7/2 = 3.5
- If either number is floating point, so is the answer – so 7.0/2 = 3.5
- 8.0/3.0 = 2.666...665?
- Floating point arithmetic does NOT give exact results!
Why not?

- Computer numbers have a fixed number of decimal places.
- Exact results with floating point numbers have an infinite number of decimal places:
  Example: $8.0/3.0 = 2.666666......$
Variables

- \( x = 2.0 \) -- \( x \) is a **variable**
- This is called an **assignment**
- Variable on left-hand side gets value on right-hand side.
- Pronounce this “\( x \) gets 2.0” or “\( x \) becomes 2.0”
- \( x = x + 3.0 \) – “\( x \) gets \( x + 3 \)”, so now \( x = 5.0 \)
Variable Names

- Legitimate names:
  - Letter (upper & lower case), number, underscore
  - Do not start with a number
  - Ex: x, y, m1, m2, xysgfh, my_ID, my_age, myAge, etc.
  - Python is case-sensitive!
  - Python command in lower case.

- Good names
  - Easy to remember and to understand the meaning
  - Not too long, not too short
  - Ex: my_age, myAge, etc.
  - Be consistent, e.g., underscore, capitalize
Errors

- Lots of things you do will cause errors
- Something Python doesn’t understand
- \( y = y+3 \) – you ask it to give the value \( y+3 \) to \( y \), but it doesn’t know what \( y \) is.
- Variables don’t stand for “any old number” like they do in algebra; a variable is always supposed to have a specific value.
Python commands in IDLE

- You can type any Python command into IDLE, and it does it immediately.
- In lower case.
- `print` is a Python command.
- `'a rose is a rose'` is a **string**.
- """9.0/7.0"""" is also a string, because it’s in quotes.
Making a program

- Do something more complicated
- Remember and repeat a bunch of commands
A program

- A program is a list of statements in a file
- \( x=2.0 \) is a statement
- Python executes the statements one by one
Your program 1

- Uses print
- Uses variables
- Uses remainder operator

- Please make sure your program runs!