Objectives

- Input
- Intro to design patterns
- Definite loops

Review: Formalizing Process of Developing Computational Solutions

1. Create a sketch of how to solve the problem (the algorithm)
2. Fill in the details in Python
3. Test the Python program with *good* test cases
   a. If errors found, debug program
   b. Repeat step 3

Approximately Chapter 3 of text book

Good Development Practices

- Design the algorithm
  - Break into pieces
- **Implement** *and* **Test** each piece *separately*
  - Identify the best pieces to make progress
  - Iterate over each step to improve it
- Write comments FIRST for each step
  - Elaborate on what you're doing in comments when necessary

`average2.py`

When to Use Comments

- Document the author, high-level description of the program at the top of the program
- Provide an outline of an algorithm
  - Separates the steps of the algorithm
- Describe difficult-to-understand code

Trick: Type Conversion

- You can convert a variable's type
  - Use the type's ***constructor***

Conversion Function/Constructor	Example	Value Returned
int(<number or string>)	int(3.77) int("33")	3 33
float(<number or string>)	float(22)	22.0
str(<any value>)	str(99)	"99"

Parts of an Algorithm

- **Input**, Output
- Primitive operations
  - What data you have, what you can do to the data
- Naming
  - Identify things we're using
- Sequence of operations
- Conditionals
  - Handle special cases
- Repetition/Loops
- Subroutines
  - Call, reuse similar techniques

Interactive Programs

2.8 in Text Book

- Meaningful programs often need input from users
- Demo: `input_demo.py`

Getting Input From User

- `input` is a ***function***
  - **Function**: A command to do something
    - A "subroutine"
- Syntax:
  - `input(<string_prompt>)`
- Semantics:
  - Display the prompt `<string_prompt>` in the terminal
  - Read in the user's input and *return* it as a string/text

Getting Input From User

- Typically used in assignments
- Examples:

Prompt displayed to user

  - `name=input("What is your name? ")`
    - **name** is assigned the string the user enters
  - `width=eval(input("Enter the width:"))`
    - **What the user enters is evaluated (as a number) and assigned to width**
    - Use **eval** function because expect a number from user

What do you think the code looks like for `input_demo.py`?

Getting Input from User

```
color = input("What is your favorite color? ")
```

Semantics: Sets the variable **color** to the user's input

Terminal:

Grabs every character up to the user presses "enter"

```
> python3 input_demo.py
What is your favorite color? blue
Cool!  My favorite color is _light_ blue !
```

`input_demo.py`

Example Using Type Conversion

- May want to restrict the type of values that a user enters
- For example, a user's age should be an integer

```
str_age = input("What is your age? ")
int_age = int(str_age)
```

Converts age to an integer

```
print("Your age is", int_age)
```

Ideally, we'd tell the user that we made a change to their input, but we don't know how to do that yet.

Another Example: Restricting User's Inputs

```
>>> x = 7
>>> yourVal = input("My val is: ")
My val is: x
>>> print(yourVal)
x
```

Another Example: Restricting User's Inputs

```
>>> x = 7
>>> yourVal = input("My val is: ")
My val is: x
>>> print(yourVal)
x
>>> yourVal = eval(input("My val is: "))
My val is: x
>>> print(yourVal)
7
>>> yourVal = int(input("My val is: "))
My val is: x
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
ValueError: invalid literal for int() with base 10:
'x'
```

What happened here?

Identify the Parts of a Program

```
# Demonstrate numeric and string input
# by Sara Sprenkle for CS111
#

color = input("What is your favorite color? " )
print("Cool!  My favorite color is _light_", color, "!")

rating = eval(input("On a scale of 1 to 10, how much do
you like Ryan Gosling? "))
print("Cool!  I like him", rating*1.8, "much!")
```

Identify the comments, variables, functions, expressions, assignments, literals

input_demo.py

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expression

Identify the comments, variables, functions, expressions, assignments, literals

Improving average2.py

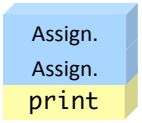
- With what we just learned, how could we improve average2.py?
- Example of suggested approach to development
  - Input is going to become fairly routine.
  - Wait on input until you have figured out the rest of the program/problem.

Design Patterns

- General, repeatable solution to a commonly occurring problem in software design
  - Template for solution

Design Patterns

- General, repeatable solution to a commonly occurring problem in software design
  - Template for solution
- Example (Standard Algorithm)
  - Get input from user
  - Do some computation
  - Display output




```
x = input("…")
ans = …
print(ans)
```


Broader Issue Groups

Ashley Mike Molly Robert Tony	Anna Kate Buddy Charlotte Lexi Win	Jae John Leslie Mira	Burke Josette Sarah Zander	Alex Austin Collin George

Algorithm Accountability Discussion

- Summarize the second article you read for the rest of the group
  - What was the controversy about the algorithm(s) in question?
- How can you enforce algorithm accountability?
- What kind of accountability do you want to see?