CS 1112: Introduction To Programming

Pseudocode; input() function;

Summary of Vocabulary

Dr. Nada Basit // basit[*at*]Virginia[*dot*]edu

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Friendly Reminders

- Your ***safety*** and ***comfort*** is important!
  - If you choose to wear a mask you are welcome to do so
  - *We will interpret wearing a mask as being **considerate and caring** of others in the classroom (<u>not</u> that you are sick), and realize that some may choose to mask to **remain distanced***

- Be an ***active*** participant in your learning!
  You’re welcome and ***encouraged*** to ask questions during class!

- If you feel ***unwell***, or think you are, please stay home
  - *We will work with you!*
  - Get some rest ☺
  - View the recorded lectures – *please allow 24-48 hours to post*
  - *Contact us!*

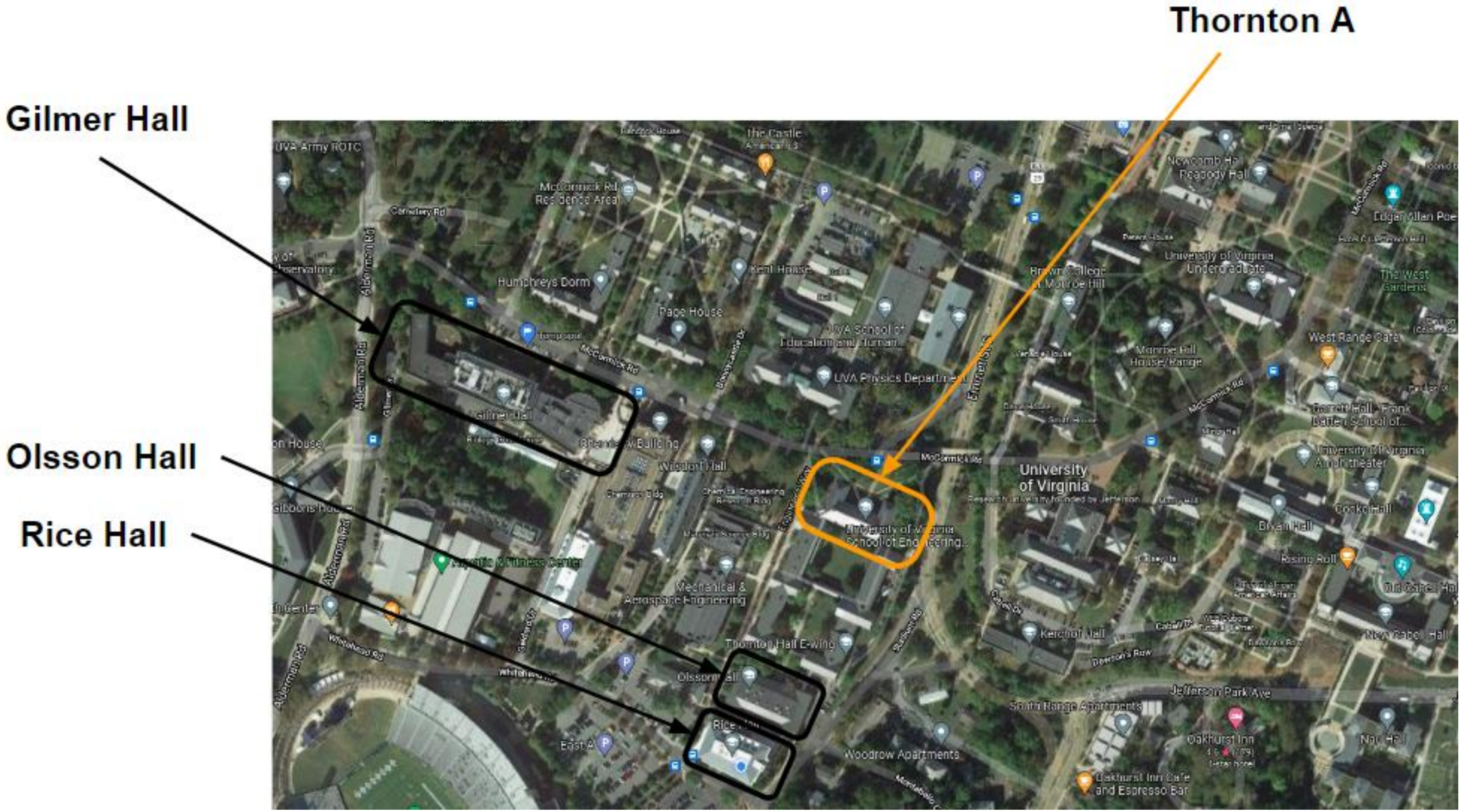
Announcements

- **Programming Assignment: PA00 - Basics & Variable Types** was released Wednesday
  - PA-00 is due by 11:00pm on January 31
    - Submit on Gradescope (not on Canvas)
- **Quiz 1** will be released today (Friday)
  - Quiz 1 is due by 11:00pm on Monday!
    - No late quizzes accepted
    - No make-up quizzes allowed
    - Remember: we do drop your lowest quiz score and give you the opportunity to make up one lowest quiz score
- Sherlock.cs.virginia.edu
  - Details will be provided in the Quiz announcement
  - Please read these details carefully
  - Those with extra-time **SDAC** accommodations, this time will be built into the quiz

TA Office Hours

- Starting Monday of next week!
- In-person in **Thornton Stacks** (Thornton A, 2nd floor)
- Join the **queue** using the **link** that will be posted on Canvas

TA Office Hours: Thornton Stacks



Thornton A

Gilmer Hall

Olsson Hall

Rice Hall

Reminder: Variables

- In Math:
  - A name that refers to a particular value
- In Statistics:
  - A name for a thing that has one value, but we don’t know what it is
- In Programming:
  - A named **value** that can vary over the course of doing something

Pseudocode

“kind of” code

A steppingstone towards writing actual code

Pseudocode

- "*Pseudo*" means "*Not quite*"
- **Code**: write things in a way a computer can understand
- Pseudocode:
  - *Not quite* in the computer's language
- Good for expressing things <u>unambiguously</u>
  - But still using **English** to gloss over the *details*

Pseudocode

- *Not formal code*
  - Informal description of algorithm
- The **syntax** is informal, the **algorithm** is not!
  - It’s still specific, detailed, and followable
  - No specific syntax
- Can be translated into a programming language by adding the proper syntax
- Clearly indicates **sequence** of actions the program will take.

Pseudocode

- Sequence
  - A series of statements that execute *one after another*

- Condition (if)
  - Used to *decide* which of two more different statement to **execute** based on certain **conditions** (that is, “do this OR do that”)

- Repetition (loop)
  - To repeat statements *while* certain conditions are true

- Named Action (Subprogram or Function)
  - A small part of another program solving a certain problem

Type casting: “reshaping” a value of one type into a value of a different type.

You can ask the compiler to tell you what data type something is by using the “type()” function. E.g., print(type(x))

Reminder: Type Casting

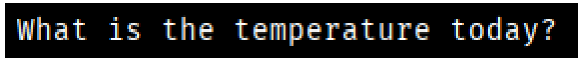
- Type-casting is a method with which we can switch (*convert*) a variable's **type** to another
- i = 1
  f = 2.9
  s = “33”
  st = “4.5”
  b = “True”
- Conversions: Result:

float to int:	`int(f)`	`2`	
int to float:	`float(i)`	`1.0`	
str to int:	`int(s)`	`33`	[*invalid*: int(“hello”)] *!!*
str to float:	`float(st)`	`4.5`	
str to bool:	`bool(b)`	`True`	[*always True*: bool(“hello”) = True] *!!*

Obtaining user input: One of the most common situations where you would use type casting!

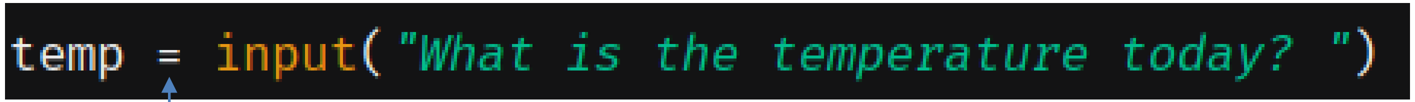
☆input() function: *receive user input (from keyboard)*

- You can use the input() function to ask a question to the user and receive input!
- This is very handy in many programs where the program requires some additional information before it can perform its tasks
- What you need:
  - A **variable** to hold the input (using an assignment statement) e.g., temp
  - The **input()** function – *takes as its parameter the question you want to ask-inside the ()s*
  - A **prompt** (question) to the user



```
What is the temperature today?
```

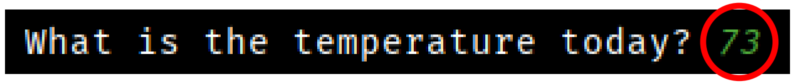
- For example:



```
temp = input("What is the temperature today? ")
```

equals symbol (=): *assignment statement*

  - The user types the answer into the console (on the screen)

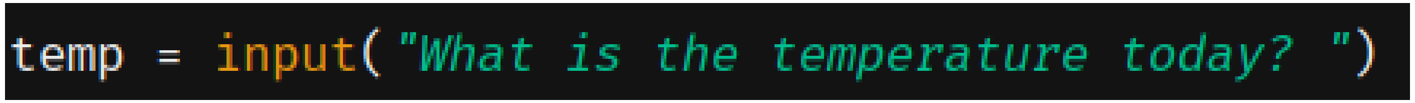


```
What is the temperature today? 73
```

  - The left-hand side of the "=" receives the value

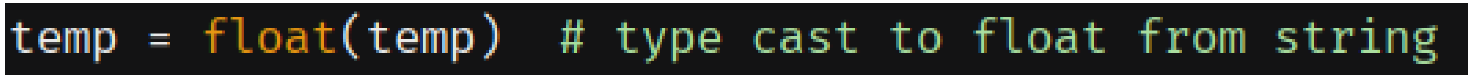
input() function: *receive user input (from keyboard)*

- **Notes**:
  - What ever input you type; it gets transferred and stored as a STRING

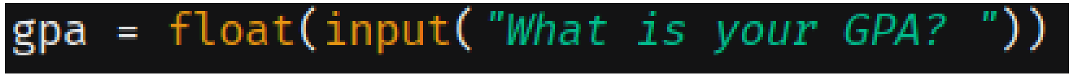


```python
temp = input( "What is the temperature today? ")
```

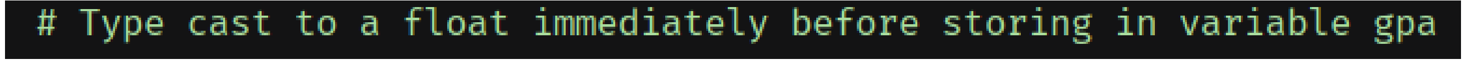
  - If you want the data to remain as a **string**, then there is nothing further you need to do
  - However, what if you ask for something like an "age" or a "temperature"? Most likely you want to do something with this number. You cannot do "math"-like things to the string "101.5" – it is *still* a string (THE OPERATIONS FOR NUMERICAL DATA DO NOT WORK ON **STRINGS**!)
    - You must **type cast** this value (to a float, for example) before you can use it as a number. There are two ways:



```python
temp = float(temp)  # type cast to float from string
```



```python
gpa = float(input( "What is your GPA? "))
```



```python
# Type cast to a float immediately before storing in variable gpa
```

Quick & Fun Survey Questions

Get to know your peers! ☺

Digital Watch or Analog Watch?

Vocabulary (1)

- **Statement**: A single action to perform (one line of pseudocode)
  - `Set X to be x / 2`
- **Execute**: Follow an instruction or sequence of instructions (“to run”)
  - `Set X to be x / 2`
  - When the computer *actually* does this line
- **Program**: the sequence of statements to be executed
- **Conditional**: Code that is only *sometimes* executed
    - A condition (your *compid* number is even)
    - Statements that you execute when the condition is **true**
    - Statements that you execute when the condition is **false** (*optional*)

```
if (condition):
     statements to execute if condition is true
otherwise:
     statements to execute if condition is false
```

- **Keyword**: a word that guides how to execute your program, e.g., **if**

Vocabulary (2)

- **Variable**: a name for a value, the value it is naming may *change* during execution - the name cannot be a **keyword**
- **Expression**: a portion of a statement describing a value
  - Set X to be x / 2
- **Loops**: statements that we might execute over and over again

```
Repeat as long as x is not equal to 2:
      statements to be repeated a # of times based on the condition
      statements to be repeated a # of times based on the condition
```

- **Functions**: functions, methods, subroutines – *named actions*
  - We have ***used*** and ***seen*** functions already! *We haven't written/defined functions ourselves, yet*

```
Type casting:  int(x)          this is using a function "int" that takes in one parameter (the item to be type casted)
User input:    input("What is your name? ")  the prompt/question is posted on the screen and the answer is captured
Printing:      print("The result is: " + str(x))        we have seen/used the print function a lot already!
```

Example - pseudocode

- Prompt the user for the day of the week
- Store the result in a variable named "day"
- Prompt the user for the current temperature (in *F)
- Store the result in a variable named "temp"
- Type-cast the value into a float
- If the day is "Saturday" or "Sunday" AND if the temperature is > 75 degrees
  - Display (print) "A lovely day for a walk"
- Else
  - Display (print) "Stay inside and read a book"

Python Demonstration

Let's jump on PyCharm!

pseudocode_user_input.py

pseudocode_in_class.py (if time)

```
elif _operation == "MIRROR_Y":
    mirror_mod.use_x = False
    mirror_mod.use_y = True
    mirror_mod.use_z = False
elif _operation == "MIRROR_Z":
    mirror_mod.use_x = False
    mirror_mod.use_y = False
    mirror_mod.use_z = True

    #selection at the end -add back the deselec
mirror_ob.select= 1
modifier_ob.select=1
bpy.context.scene.objects.active = modifier_ob
print("Selected" + str(modifier_ob)) # modifier
    #mirror_ob.select = 0
```

In-Class "lab" Activity!

Use:
pseudocode_activity_ica.py File

- In pairs or groups up to three work on the following questions
- **Convert code into pseudocode**
- **Convert pseudocode into code**
- *Do your best to be as precise as possible!*

Remember to check-in with a TA before leaving class today!

Remember to check-in with a TA and show them your solutions to the three (3) activities before you leave class today!

Pseudocode In-Class “lab” Activity

```
# -- ACTIVITY #1 --

# 1. Prompt the user to enter the first number.

# 2. Store the entered number in a variable called num1.

# 3. Prompt the user to enter the second number.

# 4. Store the entered number in a variable called num2.

# 5. Add num1 and num2 and store the result in a variable called sum.

# 6. Display the sum.
```

Remember to check-in with a TA and show them your solutions to the three (3) activities before you leave class today!

Pseudocode In-Class “lab” Activity

```
# -- ACTIVITY #2 --

# 1. Prompt the user to enter a number.

# 2. Store the entered number in a variable called num.

# 3. If num is greater than 0, display "The number is positive."

# 4. If num is less than 0, display "The number is negative."

# 5. If num is equal to 0, display "The number is zero."
```

Remember to check-in with a TA and show them your solutions to the three (3) activities before you leave class today!

Pseudocode In-Class “lab” Activity

```
# -- ACTIVITY #3 -- CODE TO PSEUDOCODE

num1 = float(input("Enter the first number: "))

num2 = float(input("Enter the second number: "))

num3 = float(input("Enter the third number: "))


total = num1 + num2 + num3

average = total / 3


print("The average is:", average)
```

Notes/Reminders…

Reminder: CS Laptop Loaner Program

- This course requires students to have a **laptop**
- I realize that not everybody might have one (nor necessarily need one for their desired major / path…)
- If you do not have a laptop for any reason… ***not to worry!***
- The CS department's Systems staff has a notebook / laptop loaner program and will be able to loan you a notebook / laptop computer for the duration of the semester if you don't have one or if you cannot afford one.
    - Also available if your laptop is broken and under repair, we can arrange for you to receive a loaner laptop for a week or two until your own laptop is fixed

Interested? Link: https://www.cs.virginia.edu/wiki/doku.php?id=cs_laptop_loaner

I am happy to be your sponsor. Please let me know.

Tools: Piazza

- We will use **Piazza** in the following way:
  - Website: https://piazza.com/ [Linked through Canvas]
  - Piazza is a great tool for asking questions about **course content**, **policies**, or getting help on **homework** assignments
  - While you are waiting for an answer, see if there's an answer you can provide to someone else's question. We're all in this together! CS is a team sport! ☺
  - TAs will monitor and answer questions throughout the semester
  - Not a means to help you debug your code! (See more below)

It is very important to remember the following:

- **Do not post** complete or partial code solutions (for Homework) on Piazza when seeking answers to your question unless it is in a **PRIVATE** post
- **Do not post** complete or partial quiz solutions (code or short-answer) when seeking answers to your question unless it is in a **PRIVATE** post

Tools: Gradescope

- We will use **Gradescope** in the following way:
  - Website: https://www.gradescope.com/
  - Linked through Canvas
  - Homework assignments will be **submitted**
    - Most programming assignments are autograded
    - Some aspects of programming assignments may be manually graded