UNIVERSITY of VIRGINIA

CS 1112: Introduction To Programming

Python Turtles (II)

Dr. Nada Basit

basit[*at*]Virginia[*dot*]edu

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 (not that you are sick), and realize that some may choose to mask to **remain distanced***
- Remember to always be **kind**, **respectful**, **supportive**, **compassionate** and **mindful of others**! ☺
- 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
  - *Contact us! We will work with you!*
  - Get some rest ☺
  - View the recorded lectures – *please allow 24-48 hours to post*

Announcements

- **Quiz 1** is done!
  - We’ll grade as soon as possible
- **Programming Assignment 00 (PA00)** is due by 11:00pm on Wednesday (***tonight***)!
- **Syllabus Quiz** is also due by 11:00pm on Wednesday (***tonight***)!
  - *Hopefully, most of you have **completed** this already*
  - *Please let us know if you have any questions*

TA Office Hours

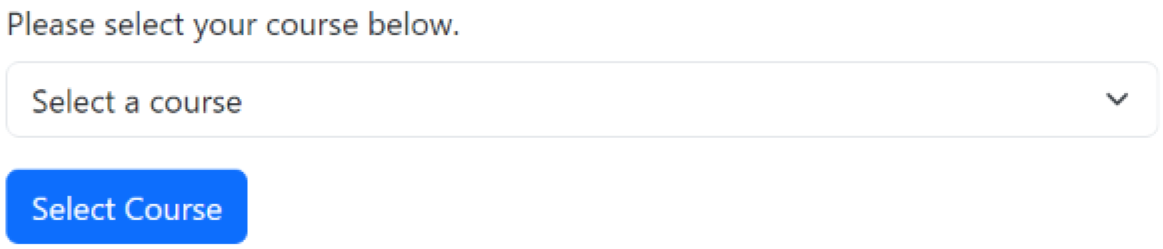
- *Check out the **Office Hour Calendar** to know when TAs are holding their Office Hours (Linked on our Canvas page)*
- In-person in **Thornton Stacks** (Thornton A, 2nd floor)
- Join the **queue** using the **link** on the left navigation bar of Canvas
  - "**TA Office Hour Queue Tool**"

Reminder: If attending Professor Office Hours – there is no need to use the Office Hour Queue Tool!

TA Office Hour Queue Tool

1. Click on “TA Office Hour Queue Tool” link on Canvas. You will be logged in via your UVa NetBadge credentials

2. Select your **course (CS 1112)** *(if you see other courses listed there, be sure you don’t click there!)*

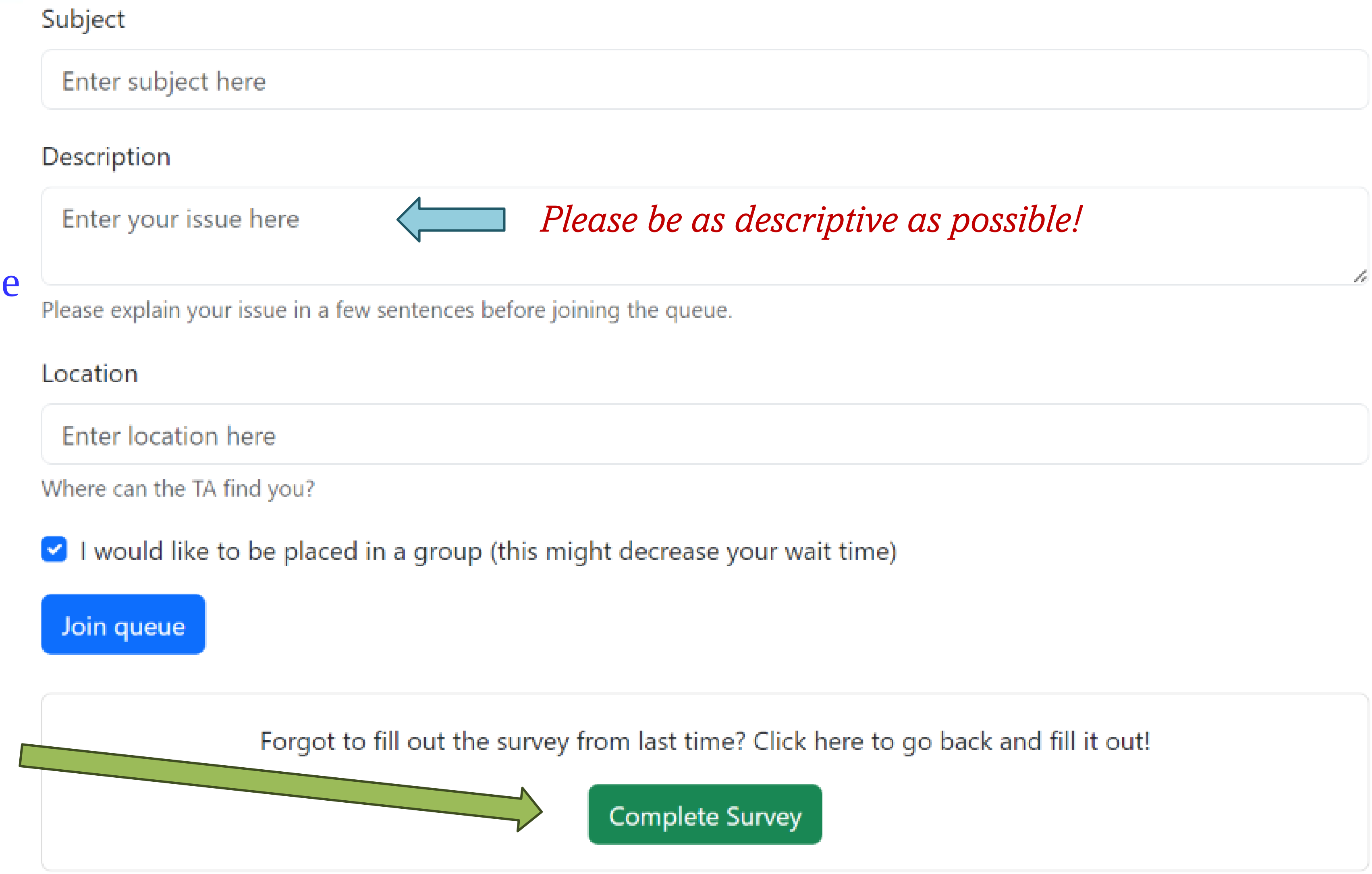


Please select your course below.

<u>Reminder</u>: Even though TA Office Hours are in-person, you must first join the electronic (online) queue!

TA Office Hour Queue Tool

3. Fill in the **details** before joining the queue
   - We strive to find ways to make the office hour experience better. To help, kindly fill out a <u>short</u> survey after each of your office hour sessions with a TA, by clicking on the “Complete Survey” button.
     Thanks for helping us improve office hours!



Subject

Enter subject here

Description

Enter your issue here

Please be as descriptive as possible!

Please explain your issue in a few sentences before joining the queue.

Location

Enter location here

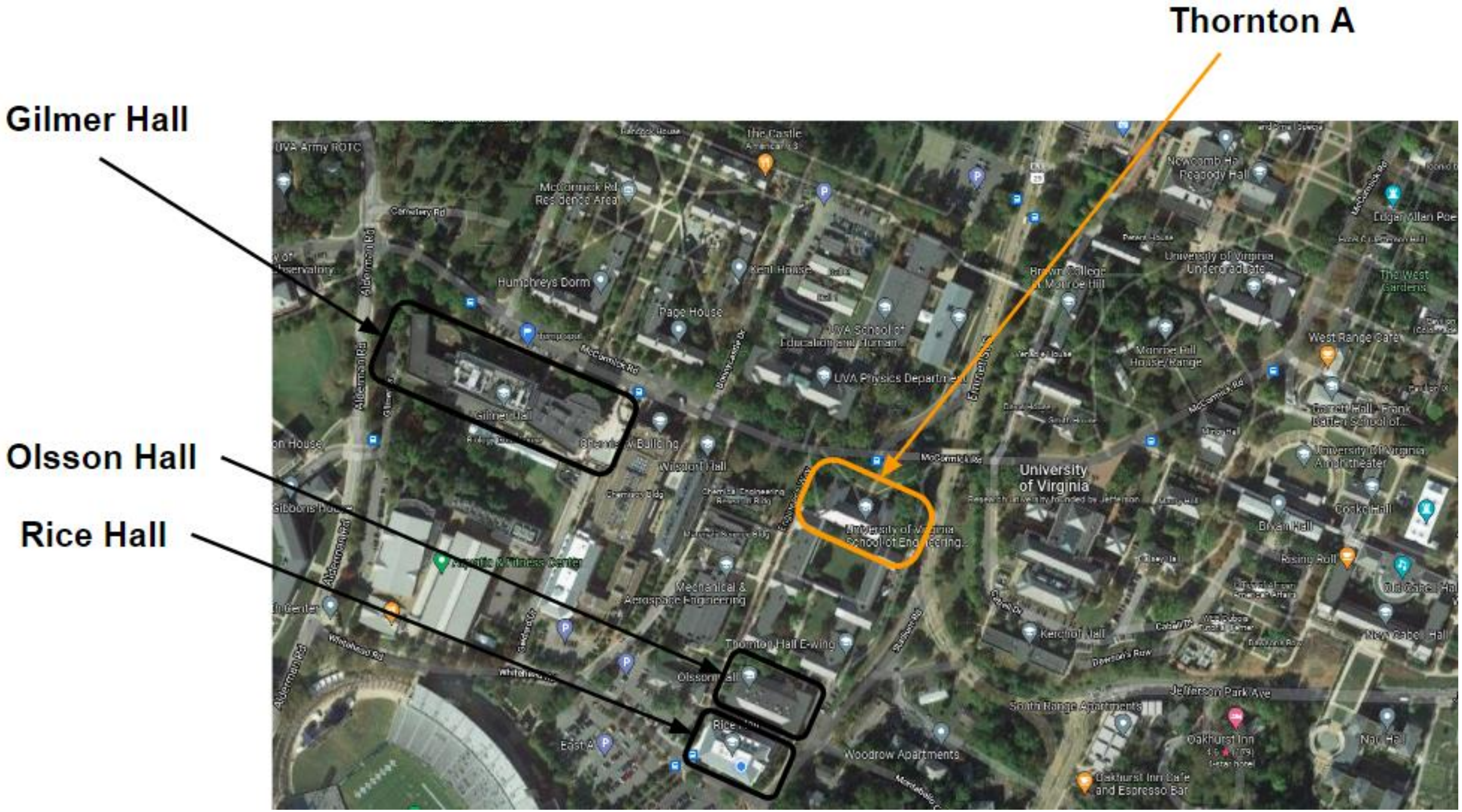
Where can the TA find you?

☑ I would like to be placed in a group (this might decrease your wait time)

Forgot to fill out the survey from last time? Click here to go back and fill it out!

Don’t be shy to ask for additional directions if you are not sure how to find Thornton Stacks!
(e.g., Ask on Piazza or ask in class)

TA Office Hours: Thornton Stacks



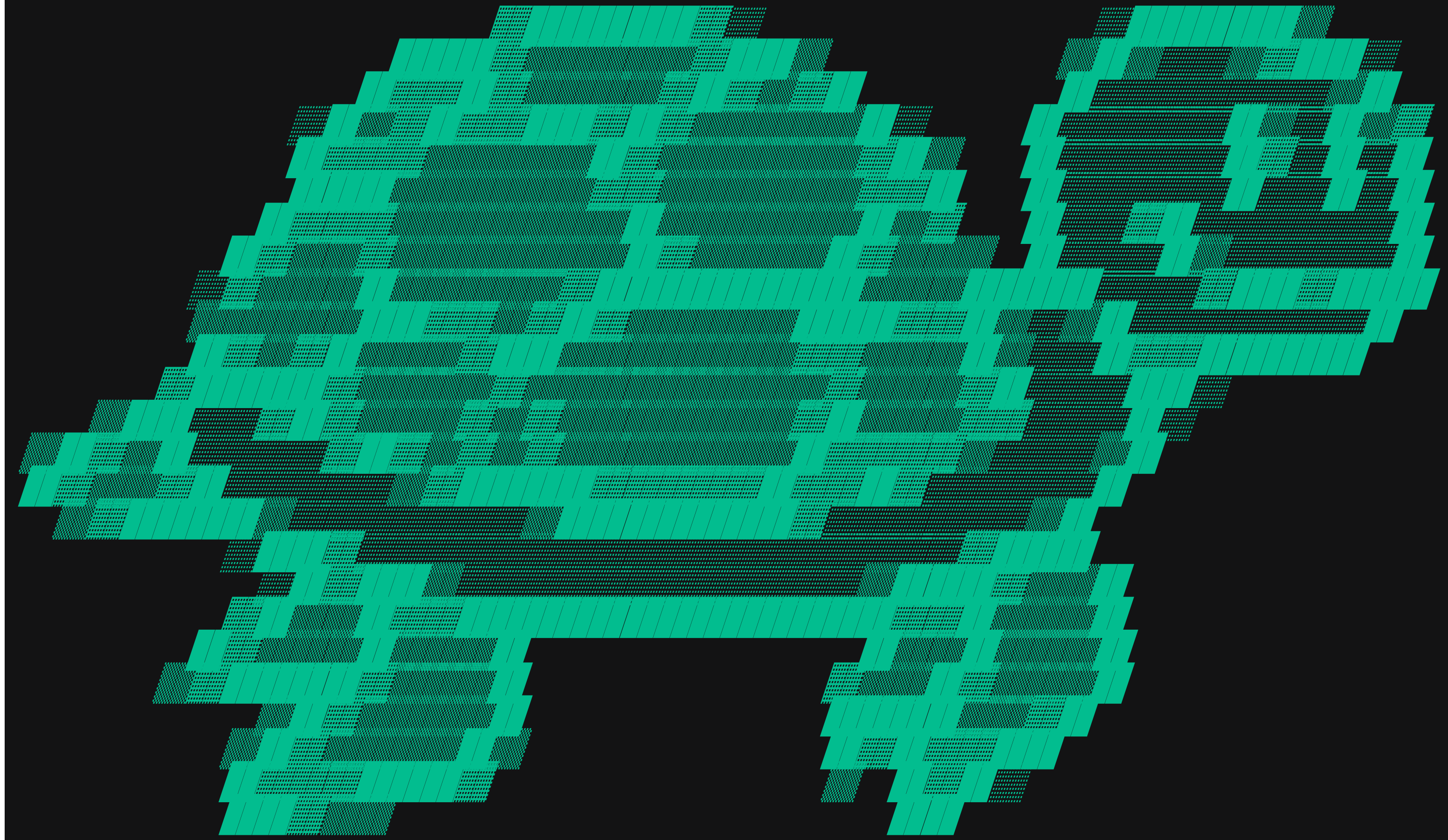
Thornton A

Gilmer Hall

Olsson Hall

Rice Hall

Python Library: “turtle”



Ready for MORE turtles? ☺

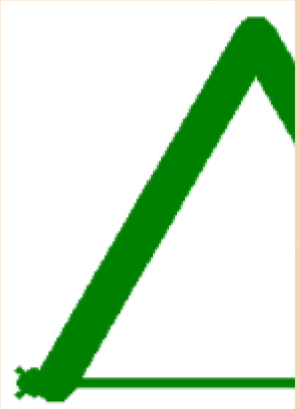
Review of Turtles-Day1 In-class “Lab” Activity

- Questions or concerns?
  - Feel free to ask questions!

Learning the “**turtle**” Library

```
toni.pensize(5)
```

Sometimes you wish to **resize** the width of the line you are drawing (make it thicker or thinner.) Use the code above.

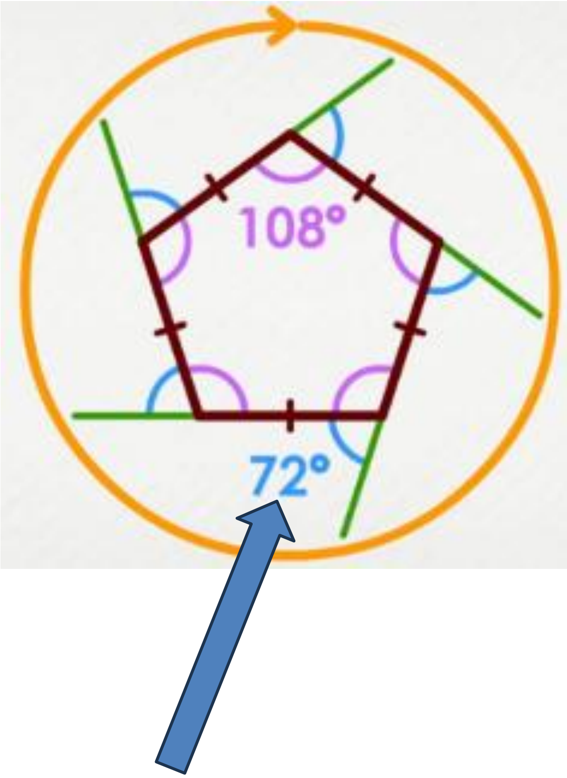


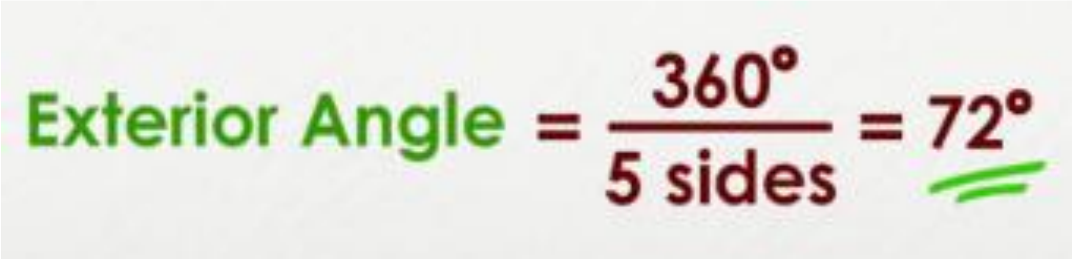
If you’re drawing a polygon, like a pentagon, what (exterior) **angle** to use? A pentagon has five (5) sides, therefore, perform the following calculation:

360 / 5 = 72 degrees

```
tobi.forward(100)
tobi.left(72)
```

EXAMPLE:
Pentagon: exterior angle





$$\text{Exterior Angle} = \frac{360°}{5 \text{ sides}} = 72°$$

Tutors.com – what is a pentagon

Learning the “**turtle**” Library

Sometimes you wish to **reset** all of the turtle settings. Use this in your code:

```
toni.reset()
```

You could also use the `.clear()` method, however that just **clears** the screen

After you call reset() you’ll have to set up new turtle attributes for your turtle (or use the default settings.)

Play around with `.reset()` and `.clear()` to see the difference!

Let’s Talk About The For-Loop in Python

- **For-loop:**
  - used when you have a block of code which you want to **repeat a fixed number of times**

- **Syntax:**

```
for val in sequence:
      statements
      statements
      .  .  .
```

  - `val` accesses each item of sequence (one at each iteration). The loop continues until we reach the last item in the sequence
  - Notice the use of **indentation**. This is *deliberate*, and indeed part of the Python *syntax*.
    - The indentation of the statements denote that these lines of code are contained within the for-loop. Once you unindent, those lines are no longer part of the body of the loop.

For-loop Examples:

- The sequence could be a string of characters

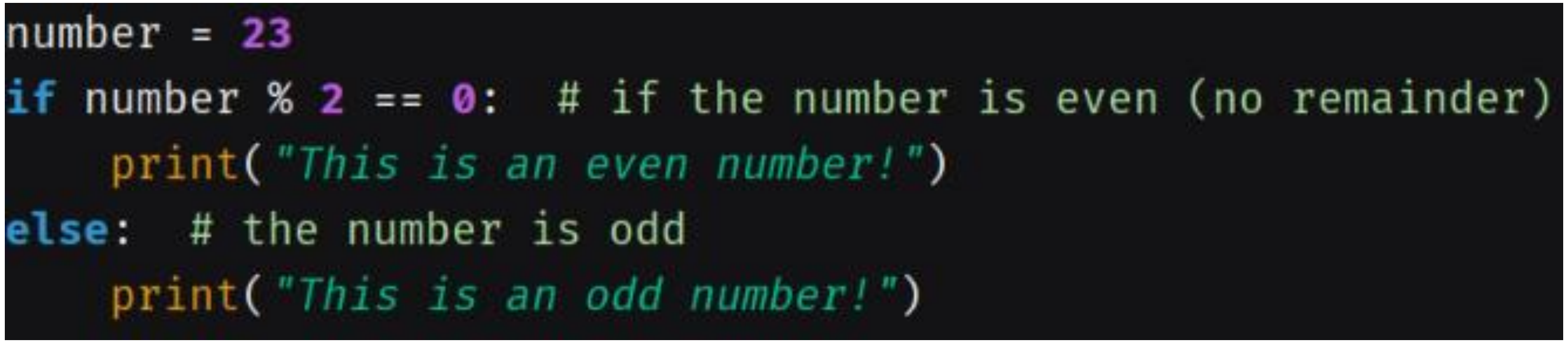
```
for x in “Python is fun!”: # this for-loop iterates 14 times
      print(x)
```

- The sequence can be generated by the function, `range()`.
  - The range() function returns a sequence of numbers, starting with 0 by default, and increments by 1 (by default), and ends at a specified number.
  - For example, range(6) is not the values 0 to 6, but the values 0 to 5 (still, 6 numbers!)
  - For example, range(2, 6) is the values 2 to 5 (not including 6)
  - Here’s how we can use a for-loop to iterate over a range:

```
for x in range(6): # this for-loop iterates 6 times
      print(x)
```

Remember Modulus (%)?

- What else can the modulus operator be used for?
- You can use it as an easy way to determine if a value is <u>odd</u> or <u>even</u>!
  - Two divides into an even number evenly without a remainder (remainder of 0)
  - Two divides into an odd number leaving a remainder (remainder of 1)



```
number = 23
if number % 2 == 0:  # if the number is even (no remainder)
    print("This is an even number!")
else:  # the number is odd
    print("This is an odd number!")
```

- What if you decide to draw something specific if the number is odd and draw something else if the number is even? (Given a range of numbers: 0, 1, 2, 3, 4, 5, 6, 7, 8, …)

Think about this idea for your in-class “lab” activity today! ☺

Python Demonstration

Let’s jump on PyCharm!

simple_polygons.py

demo_turtle_drawing.py

Zigzag Turtles!

- In pairs or groups up to three work on the following turtles and pseudocode in-class “lab” activity
- **drawing_zigzag_ica.py**
- *See if you can incorporate the modulus operator (%) to draw a zigzag line with the turtle library.*

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

In-Class “lab” Activity!

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 are manually graded)
    - Some aspects of programming assignments may be manually graded