# CompSci 101
# Fall 2021

Lecture 8

# Reminders

- **Identity & Computing Lecture Series**
  - https://identity.cs.duke.edu/speakerSeries.html
  - 9/27-Dr. Michele Williams
- **No lab Friday, 9/24**

- **Assignments**
  - Assign 1 due today
  - Assign 2 live today

# Key instructions

- **Input**
- **Output**
- **Assignments* ✓**
- **Math/Logic ✓**
- **Conditionals✓**
- **Repetition ←**

***not listed in book***

# Python Data Types

- **int, float, bool ✓**
- **Collections**
  - Strings ✓
  - Lists ✓
  - Tuples
  - Sets
  - Dictionaries

# PFTD

- **Loops (for)**
  - range()
  - Traversing strings/lists
- **Accumulators**
- **Split/join**

“The mere imparting of information is not education.”

- Dr. Carter G. Woodson

# KISS Principle

- **Think of the non-computing context for any word/terms**
- **KISS model**
  - Work smarter, not harder!!
- **“Good programmers are simply good designers.”**
  - *-Dr. Washington*
- **Design first and always!**
- **Importance of reusability**
- ***USE PYTHON TUTORS IF YOU HAVE QUESTIONS!***

# People to Know: Dr. Richard Tapia

- UCLA (BA, MA, PhD, Math)
- University Professor, Rice University
  - 6th person w/title in 100-year history
- Research
  - Computational/mathematical sciences
  - Education/outreach
- National Academy of Engineering
  - 1st Hispanic person elected.
- National Medal of Science
- Conferences in Honor
  - Tapia Celebration of Diversity in Computing
  - Blackwell-Tapia Conference

# Split vs. Join

Break single string into list of strings

*var* = *name*.split()

*var* = *name*.split(*arg*)

arg→variable or string

“Glue” strings in a list together to form a single string

*var* = *glue*.join()

glue→variable or string

# Split vs. join examples

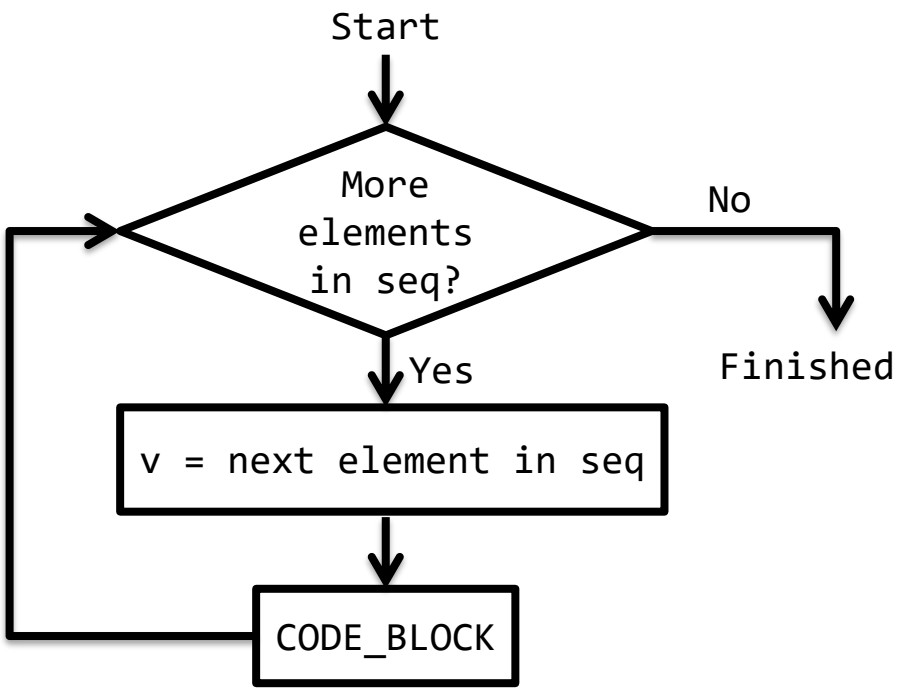
```
7  if __name__ == '__main__':
8      phrase = "Hi! There! Neighbor!"
9
10     lst = phrase.split()
11     print(lst)
12
13     lst2 = phrase.split("!")
14     print(lst2)
```

```
16     test = ['Give', 'me', 'a', 'chance', '!']
17
18     result = ' '.join(test)
19     print(result)
20
21     result2 = '*'.join(test)
22     print(result2)
```

# Anatomy of a for loop

```
for v in seq:
    CODE_BLOCK
```

```
if __name__ == '__main__':
    for number in [0, 1, 2, 3]:
        print(number)
```



# range() function

```
if __name__ == '__main__':
    for number in [0, 1, 2, 3]:
        print(number)
```

- What about larger numbers?

- *range(stop)*
  - 0 up to (not including) stop
- *range(start, stop)*
  - Specify start value (increment by 1)
- *range(start, stop, step)*
  - Specify step value

# Activity 1: https://bit.ly/101f21-09-23-1

# Why use loops?

- **Repetition**
  - Keeping a running total (counter)
  - Summing (other repetitive calculations)
- **Accumulators**
  - “Accumulate”-*acquire an increasing number of quantity of*.
- **Rules for accumulators**
  - Initialize the “running total”
  - Don’t initialize inside the loop
  - Increase the total with each iteration

# Another way to use accumulators

```
def square(x):
    #raise x to the second power
    runningtotal = 0
    for counter in range(x):
        runningtotal = runningtotal + x

    return runningtotal
```

```
def square(x):
    #raise x to the second power
    runningtotal = 0
    for counter in range(x):
        runningtotal += x

    return runningtotal
```

# Activity 2
# https://bit.ly/101f21-09-23-2

# Traversing strings

Print each character in the string

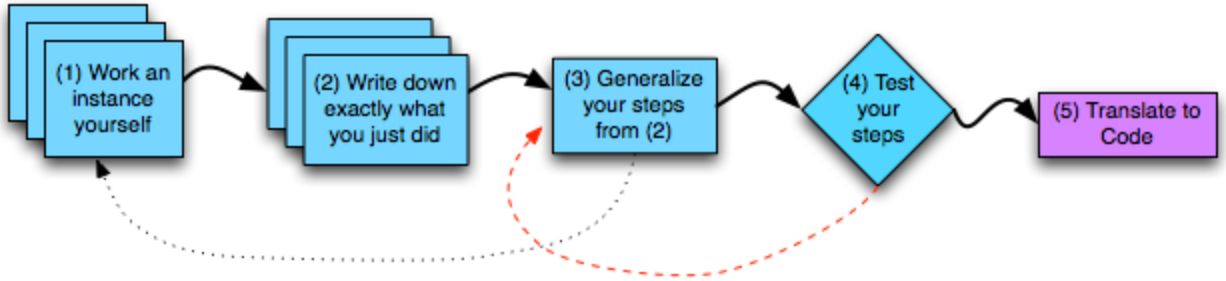
```
if __name__ == '__main__':
    name = "Tiana"
    for i in range(5):
        print(name[i])
```

Can this be simplified?
What about printing the characters in reverse order?

# Accumulators with Strings

- **How is “+” used with strings?**
  - Concatenation
  - result = “string1” + “string2”
- **Still require initialization**
  - Empty string (“”) instead of 0
- **Still “acquiring/increasing quantity.”**
  - Appending to string

# Designing Solution




1. **Work an instance: “Duke” -> “Dk”**
2. **What did we do?**
   a. Paper and pencil, write it down!
3. **Generalize**
4. **Test: “Computer” -> “Cmptr”?**

# Activity 3
# https://bit.ly/101f21-09-23-3

- **Write a function `isVowel(ch)`**
  - Returns true if the input is a vowel and false otherwise
  - Input: string of a single character (length 1)
  - Return: bool

# Why would we use “not in” instead of “in” for Activity 3?

- **KISS**
- **Which is simpler to use?**
  - What’s required to use “in”?
  - What’s required to use “not in”?
  - Which is simpler to design/implement?

# Which is better to traverse list?

```
fruits = ["apple", "orange", "banana", "cherry"]

for position in range(len(fruits)):     # by index
    print(fruits[position])
```

```
fruits = ["apple", "orange", "banana", "cherry"]

for afruit in fruits:       # by item
    print(afruit)
```

# Remember lists are mutable…

```
numbers = [1, 2, 3, 4, 5]
print(numbers)

for i in range(len(numbers)):
    numbers[i] = numbers[i] ** 2

print(numbers)
```

# Reminders

- **Work smarter, not harder**
- **Design first**
- **Try to identify where you are stuck**
  - Identify resources to help solve problem
- **Leverage your design and PythonTutor to understand program flow of control**
  - http://pythontutor.com