range; Accumulator pattern

COSC 101, 2018-02-12

Announcements
● Homework #2 due Thursday @ 11pm

Outline
● Warm-up
● range
● Accumulator pattern
● Programming practice

Warm-up
What is the output of this program?
import turtle
window = turtle.Screen()
theo = turtle.Turtle()
for line in [1,2,3,4]:
    theo.forward(50)
theo.penup()
theo.forward(50)
theo.pendown()
window.exitonclick()

range
● Function that generates a sequence of integers
● range(NUM) --- generates a sequence of NUM integers from 0 to NUM-1
  ○ E.g., range(3) = [0, 1, 2]
● range(START, STOP) --- generates a sequence of STOP-START integers from START to STOP-1
  ○ E.g., range(2,5) = [2, 3, 4]
● range(START, STOP, INCREMENT) --- generates a sequence of integers from START to (STOP-1)*INCREMENT, with INCREMENT added to each successive integer
  ○ E.g., range(2,8,2) = [2, 4, 6]
● Sequence of integers is generated on-demand --- use list(range(...)) to get the full sequence
● What sequence of integers is produced by each of the following invocations of range?
  a. range(6)
     [0, 1, 2, 3, 4, 5]
  b. range(10, 15)
     [10, 11, 12, 13, 14]
  c. range(5, 10)
     [5, 6, 7, 8, 9]
  d. range(0, 7, 3)
     [0, 3, 6]
e. range(20, 15, -1)
   [20, 19, 18, 17, 16]
f. range(14, -15, -7)
   [14, 7, 0, -7, -14]

● What call to range would produce each of the following sequences of integers?
  a. [10, 20, 30, 40, 50]
     range(10, 51, 10)
  b. [101, 102, 103, 104]
     range(101, 105)
  c. [15, 12, 9, 6]
     range(15, 5, -3)
  d. [0, 2, 4, 6, 8, 10]
     range(0, 11, 2)

Accumulator pattern
● Process of iteratively updating a variable
● To use the accumulator pattern, you must know:
  ○ What do you want to compute?
  ○ What is its type?
  ○ How can you build it one piece at a time?
● Applying the pattern
  accumVar = 0 # initialize accumulator variable; use the correct type
  for i in range(10): # iterate desired number of times
    accumVar = accumVar + 1 # update accumulator variable
  print(accumVar) # value of accumVar after the loop is the final result
● Example: computing an average
  sum = 0
  for i in range(4):
    sum += int(input("Enter a number: "))
  avg = sum / 4
  print(avg)
● What is the output of the following programs? If necessary, provide input of your choosing.
  a. f = 1
     for i in range(1, 4):
       f = f * i
     print(f)
     Output:
     12
  b. word = input("Enter a word: ")
     spell = ""
     for c in word:
       spell += c + "-"
     print(spell)
     Output:
     Enter a word: train
     t-r-a-i-n-
c. greeting = "Hello 
    for part in ['first','middle','last']:
        name = input("What is your " + part + " name? ")
        greeting = greeting + name + " 
print(greeting)
Output:
What is your first name? Aaron
What is your middle name? Robert
What is your last name? Gember-Jacobson
Hello Aaron Robert Gember-Jacobson

Programming practice
a. Write a program that asks a user how many steps they walked each day of the week and computes their step total for the week.
   week_steps = 0
   for day in ["Sun","Mon","Tues","Wed","Thurs","Fri","Sat"]:
       daily_steps = input("How many steps did you walk on "+day+"? ")
       week_steps += int(daily_steps)
   print("You walked " + str(week_steps) + " this week")

b. Write a program that asks for the dimensions of multiple rooms and computes the total square footage of a house or apartment.
   total_area = 0.0
   for room in ["living room", "kitchen", "bedroom", "bathroom"]:
       length = float(input("What is the length of the " + room + "? "))
       width = float(input("What is the width of the " + room + "? "))
       room_area = length * width
       total_area += room_area
   print("The total square footage is " + str(total_area))

c. Write a program that asks the user for a word and prints the palindrome of the word (e.g., if the user enters "dog" the output would be "doggod").
d. Write a program that flips a coin as many times as the user requested and outputs the fraction of flips that were heads.
e. Write a program that plays rock, paper, scissors three times and prints whether the user or computer won the majority of the rounds.