for loops

Announcements
● Homework #2 due next Thursday @ 11pm

Outline
● Warm-up
● for loop
● Refactoring code
● Programming practice

Warm-up
For each of the following programs, which code blocks will be executed when the listed conditions are true?

a. if condition 1:
    code block A
elif condition 2:
    code block B
else:
    if condition 3:
        code block C
    else:
        code block D

When conditions 1 and 2 are True? A
When only condition 3 is True? C
When no conditions are True? D

b. if condition 1:
    code block A
    if condition 2:
        code block B
        if condition 3:
            code block C
        else:
            code block D
    else:
        code block E

When conditions 1 and 2 are True? A, B
When only condition 1 is True? A, D
When no conditions are True? E

for loop
● What is the purpose of a for loop? --- to do something repeatedly without duplicating the same code
● Syntax:
    for loop_variable in list:
        repeatedly executed statements (i.e., the loop body)
● How many times is the loop body executed? --- as many times as there are items in the list; each time is called an iteration
• When is the loop variable updated? --- before the loop body is executed each time (i.e., before each iteration)

• What is executed after the loop is finished? --- the statements that come after the loop body and have the same level of indentation as the line containing for

• What is the output of each of the following programs?
  a. for num in [5,4,3,2,1]:
     print(num)
  Output:
  5
  4
  3
  2
  1
  b. for tree in ['apple', 'orange', 'pear']:
     print(tree)
  Output:
  apple
  orange
  pear
  c. for num in [1,2,3,4,5,6]:
     if num%2 == 0:
     print(num)
  Output:
  2
  4
  6
  d. for num in [1,2,3]:
     result = num
     print(result)
  Output:
  3
  e. import turtle
     window = turtle.Screen()
     joon = turtle.Turtle()
     for side in [a,b,c,d,e,f,g,h]:
     joon.right(45)
     joon.forward(100)
     window.exitonclick()
  Output:
Refactoring code

Each of the following programs contains redundant code. Rewrite the program to eliminate the redundancy.

a. import random
die1 = random.randrange(0,6)
die2 = random.randrange(0,6)
die3 = random.randrange(0,6)
print("Die 1: " + str(die1))
print("Die 2: " + str(die2))
print("Die 3: " + str(die3))

Rewritten:
import random
for num in [1,2,3]:
    roll = random.randrange(0,6)
    print("Die " + str(num) + ": " + str(roll))
b. import turtle
    window = turtle.Screen()
    ash = turtle.Turtle()
    ash.left(120)
    ash.forward(100)
    ash.left(120)
    ash.forward(100)
    ash.left(120)
    ash.forward(100)
    ash.left(180)
    ash.left(120)
    ash.forward(100)
    ash.left(120)
    ash.forward(100)
    ash.left(120)
    ash.forward(100)
    window.exitonclick()

Rewritten:
import turtle
window = turtle.Screen()
ash = turtle.Turtle()
ash.pensize(3)
for side in [1,2,3]:
    ash.left(120)
    ash.forward(100)
    ash.left(180)
for side in [1,2,3]:
    ash.left(120)
    ash.forward(100)
window.exitonclick()
c. x = int(input("x coordinate: "))
   y = int(input("y coordinate: "))
   if x < 0:
       if y < 0:
           print("Lower Left")
       elif y > 0:
           print("Lower Right")
       else:
           print("Lower Center")
   elif x > 0:
       if y < 0:
           print("Upper Left")
       elif y > 0:
           print("Upper Right")
       else:
           print("Upper Center")
   else:
       if y < 0:
           print("Middle Left")
       elif y > 0:
           print("Middle Right")
       else:
           print("Middle Center")

Rewritten:
if x < 0:
    xquad = "Lower"
elif x > 0:
    xquad = "Upper"
else:
    xquad = "Middle"
if y < 0:
    yquad = "Left"
elif y > 0:
    yquad = "Right"
else:
    yquad = "Center"
print(xquad, yquad)

Programming practice
a. Write a program that prints a timetable for a shuttle. Ask the user for the hour and minute when the shuttle starts running and how frequently (in minutes) the shuttle runs. Display the next three times the shuttle will arrive.
b. Write a program that rolls a 6-sided die 5 times.
c. Write a number guessing game program: The computer chooses a random number between 1 and 20. The user has 5 chances to guess the correct number. When a user makes a guess, the program should tell them if their number is correct, too high, or too low.