Worksheet: Function composition

COSC 101, 2018-02-16

1) Warm-up

Label each of the following in the program below:

a) Function header
b) Loop variable
c) Function body
d) Accumulator variable
e) Docstring
f) Function definition
g) Parameter
h) Function call
i) Global variable
j) Return statement
k) Local variable

import random
NUM_CARDS = 5

def deal_card(suit):
    message = "Dealing a " + suit
    print(message)
    number = random.randrange(2,10)
    return str(number) + " of " + suit + "s"

hand = "Hand:"
for i in range(0, NUM_CARDS):
    hand = hand + deal_card("heart") + "", "
print(hand)

Parameters and variables example

def demoFn():
    varLocal = 10 # Defines local variable called varLocal
    print(varGlobal) # Can access global variable varGlobal within function
    varGlobal = 7 # Defines new local variable called varGlobal

varGlobal = 5
demoFn()
print(varGlobal) # Will still have value 5
print(varLocal) # Cannot access local variable varLocal outside of function
2) Parameters and variables
What is the output of each of the following programs? If the program contains an error, describe the error.

a) def add(a, b):
   
   """Add two numbers""
   print(a + b)

   def sub(a, b):
   
   """Subtract two numbers""
   print(a - b)

   add(2, 3)
   x = 8
   y = 2
   sub(x, y)
   add(x + y, 1 + 2)

b) def multiply():
   
   """Multiply two numbers""
   print(x * y)

   def divide(a, b):
   
   """Divide two numbers""
   print(a / b)

   x = 4
   y = 2
   multiply()
   divide(x, y)

c) def sum(x, y):
   
   """Add two numbers""
   print(x + y)

   x = 1
   y = 2
   sum(5, 6)

d) def increment(x):
   
   """Add one to a number""
   x = x + 1

   a = 2
   increment(a)
   print(a)
def ten():
    """Set x to ten""
    x = 10

ten()
print(x)

3) Return values

What is the output of each of the following programs?

a) def magic(a):
    """Manipulate a number""
    return a * 2

    x = 5
    print("x was " + str(x))
    x = double(x)
    print("now it is " + str(x))

b) def compute_grade(exam1, exam2, exam3):
    """Compute a student's grade""
    sum = exam1 + exam2 + exam3
    return sum / 3

def letter(grade):
    """Get a student's letter grade""
    if grade >= 90:
        return "A"
    elif grade >= 80:
        return "B"
    elif grade >= 70:
        return "C"
    elif grade >= 60:
        return "D"
    else:
        return "F"

    grade = compute_grade(75, 85, 80)
    print("Grade: " + letter(grade))
4) Function composition
What is the output of each of the following programs for each of the provided sequences of input?

a) def contribute(item):
   """Ask for a person's contributions to something""
   amount = float(input("Contribute to "+item+: "))
   return amount

def compute_deductions():
   """Calculate total deduction""
   charity = contribute("charity")
   ira = contribute("an IRA")
   itemized = charity + ira
   if itemized < 6350:
       itemized = 6350
   return itemized

def taxable(income, deductions):
   taxable = income - deductions
   return taxable

def main():
   income = float(input("Earn "))
   deductions = compute_deductions()
   net = taxable(income, deduct)
   print("Taxable income: $"+str(net))

main()

Inputs A: 99000, 5000, 4000

Inputs B: 50000, 500, 1000
b) def alpha(x, y):
    return x + y

def beta(x):
    z = alpha(x, 3)
    return z**2

i = int(input("Number? "))
print(beta(i))

Input A: 4

Input B: 1

c) def func1(a, b, c):
    print(b)
    print(a)
    print(c + a)
    return a + b

def func2(a, b, c):
    print(b)
    return c + a

def func3(a, b, c):
    print("W"+b)
    return b + a

a = "X"
b = "Y"
c = "Z"
d = func1(b, c, a)
e = func2(d, a, b)
print(func3(a, e, func1(e, d, c)))