**COMP130 HW6: Functions with return values; recursion
instructor: John MacCormick**

Question 1. Consider the following function:

def add\_them\_up(a,b,c):

 sum = a + b + c

 return sum

(a) (2 points) How can you tell that add\_them\_up is a function that returns a value?

(b) (2 points) What value will the add\_them\_up function return when called with the arguments 5, 15 and 10?

(c) (2 points) Write a one-line statement that uses the add\_them\_up function to print the sum of 352, 512, and 97.

Question 2. Consider the following function:

def our\_own\_max(a,b):

 if a > b:

 return a # 1

 else:

 return b # 2

(a) (2 points) Which return statement (#1 or #2) would be executed by x=our\_own\_max(3,5)?

(b) (2 points) Which return statement (#1 or #2) would be executed by x=our\_own\_max(7,7)?

(c) (2 points) Write a one-line statement that uses the our\_own\_max function to print the maximum of the two numbers 11 and 8.

(d) (2 points) Write a one-line statement that uses the our\_own\_max function to print the maximum of the three numbers 11, 8, and 15. Hint: Use your answer to the previous part of this question as part of the solution.

Question 3. (6 points) Consider the Python statements below, which are deliberately out of order.

length = math.sqrt(square)

return length

def hypotenuse\_length(side1, side2):

square = side1\*\*2 + side2\*\*2

Rearrange these statements, with correct indentation, to define a function that computes and returns the length of the hypotenuse of a right triangle with side lengths side1 and side2.

Question 4. (10 points) Write a function named fahrenheit\_to\_celsius that takes a temperature in degrees Fahrenheit as an argument and returns the equivalent temperature in degrees Celsius.

Question 5. (10 points) Write a program that uses your function from the previous question to achieve the following. It prompts the user for a temperature in Fahrenheit, converts the temperature to Celsius, then prints the temperature in Celsius.

Question 6. Consider the following function, which currently contains some bugs:

def get\_price(age, price):

 if age < 12 or age > 65:

 child\_and\_senior\_price = price \* 0.5

 return child\_and\_senior\_price

 elif age > 12 and age < 18:

 student\_price = price \* 0.75

 return student\_price

 elif age > 18 and age < 65:

 return price

(a) (2 points) Assuming age is an integer, what are the smallest and largest values of age that will cause this function to return the student price?

(b) (2 points) Write a statement that calls get\_price with an age of 12 and a price of $9.55.

(c) (4 points) What value is returned from the call in part (b)? Why is that value returned?

(d) (2 points) What other values will cause the get\_price function to return this incorrect value?

(e) (10 points) Write a corrected version of the function, assuming that people aged 12 or 65 receive the child/senior discount and people aged 18 receive no discount.

Question 7. (10 points) Write a function is\_student(age) that takes a single integer parameter. The function returns the Boolean value True if the age corresponds to a student (using the definition from the previous question), and False otherwise.

Question 8. (10 points) Rewrite your answer to the final part of Question 6, this time including an appropriate call to the function you wrote in the previous question.

Question 9. (10 points) Write a test function, using the assert statement as described in class, which achieves statement coverage for the function in the previous question.

Question 10. (5 points) Consider the following recursive function.

def h(n):

 if n == 1:

 return 2

 else:

 prev = h(n - 1)

 return (prev + 30) / 2

What is h(3)?

Question 11. (10 points) Refer back to the assigned reading for our class on Computing & The Greater Good. Choose one of the false dichotomies discussed in that article. Write 50-100 words describing why you agree that this is a false dichotomy, or alternatively explain why you disagree. (Longer answers will not be penalized.)

Question 12. (10 points) Refer back to your notes on our discussion of open-source software during our class on Computing & The Greater Good. Choose one of the open-source software products that was discussed during class. Write about 50-100 words describing some of the advantages and disadvantages of using this open-source product, compared to using a closed-source product with similar functionality. (Longer answers will not be penalized.)

Total points on assignment: 115