**CSCI 169 Programming HW 3**

35 points

Python 2

Due Wed. Apr. 22 at the beginning of class

You may wish to look at this discussion of common errors in Python:   [https://www.mimirhq.com/blog/understanding-common-errors-in-python (Links to an external site.)](https://www.mimirhq.com/blog/understanding-common-errors-in-python" \t "_blank)

1. (5 points)  Write a function in python

def fun(x, y):

that if called with

fun(1, 2)

returns 3

and if called with

fun("hi", "there")

returns “hithere”

and if called with

fun(5, 2)

returns 7

etc.

Your function should work for any input as long as both inputs are strings or both inputs are numbers.

1. (10 points)  Write a function in python

def report(xs):

that if called with

report([“Jill”, “Johnson”, 87, “Billy”, “Ray”, “Cyrus”, 78, “Rita”, “Yeats”, 94, “Bobbie”, “Sue”, “Palmer”, 72])

returns the string

“Jill, Billy Ray, Rita, Bobbie Sue, averaged 82.75.”

Your function should work for any input list formatted similarly to the example, with first, possibly middle, and last names, followed by a score.

1. (5 points)  Explain in words the output of the following program  (copy from here:  [http://math.scu.edu/~linnell/169resources/scopehw.py (Links to an external site.)](http://math.scu.edu/~linnell/169resources/scopehw.py" \t "_blank) )

def scope\_test():

    def do\_local():

        spam = "local spam"

    def do\_nonlocal():

        nonlocal spam

        spam = "nonlocal spam"

    def do\_global():

        global spam

        spam = "global spam"

    spam = "test spam"

    do\_local()

    print("After local assignment:", spam)

    do\_nonlocal()

    print("After nonlocal assignment:", spam)

    do\_global()

    print("After global assignment:", spam)

scope\_test()

print("In global scope:", spam)

1. (15 points)  In this problem, you will write a Python program to solve the 8-Queens problem.  In chess, a queen can move any number of squares horizontally, vertically, or diagonally.   The 8-queens problem is the problem of trying to place eight queens on an empty chessboard in such a way that no queen can attack any other queen.  This problem is intriguing because there is no efficient algorithm known for solving the general problem.  Rather, the straightforward algorithm of trying all possible placements is most often used in practice, with the only optimization being that each queen must be placed in a separate row and column:
   1. Starting with the first row, try to place a queen in the current column.
   2. If you can safely place a queen in that column, move on to the next column
   3. If you are unable to safely place a queen in that column, go back to the previous column, and move that queen down to the next row where it can safely be placed. Move on to the next column.

Write a program in python to solve the 8-queens problem.  Your program should produce as output an 8X8 diagram of the chessboard, with a 1 indicating the presence of a queen in a square and a 0 indicating the absence of a queen.

Hints:    You can represent the board as either an 8X8 list or as a one-dimensional list with the ith item representing the row number of the queen in column i.  You can solve this problem recursively or iteratively, but the recursive solution is usually much easier.

Note:  You only need to find one solution.

**Submission instructions:**You will submit through Camino, Upload a file for each item 1-4.  Please name each file:

yourlastname-problem1.py

yourlastname-problem2.py

yourlastname-problem3.txt

yourlastname-problem4.py