Raymond A. Mason School of Business
WILLIAM & MARY

Masters of Science in Business Analytics Program
Python Competency Exam

Submit two python programs one for each of the two tasks outlined below. Also, submit screen shots of the resulting output from each of the two programs (i.e., by using the snipping tool, or using Alt-Print Screen to capture the output from the Spyder Console Window).

Program 1
Implement these tasks in your Python program that you name program1.py:

- Create a program entitled `program1.py` that does the following:
  - Reads this text file, `program1.csv`, into a two-dimensional list structure called `values_list`. Assume that the data in each row of this text file constitutes a list that you will place within an overall list. This data in this file are integers on the range from 0 to 9. Write this part of your program, as well as all parts of this program so they will handle any number of rows of data and any number of integers within each of the rows.
  - Print out the two-dimensional list in a well-formatted (that is, readable) format
  - Create a dictionary in `program1.py` called `dict_ref` with the following information

Dictionary Key	Corresponding Value
0	'small'
1	'small'
2	'small'
3	'mid-range'
4	'mid-range'
5	'mid-range'
6	'mid-range'
7	'large'
8	'large'
9	'large'

  - Create a new list called `text_list` of the same dimensions as `values_list` which, rather than containing integers, contains the appropriate text classifier from the dictionary `dict_ref`. For example, a value of 4 in `values_list` would be replaced with the text 'mid-range'. For efficiency, incorporate a loop structure to implement this interpretation.
  - Print the new list `text_list` as described above in a readable format.
  - Also print the new list `text_list` in transposed format, i.e., by transposing the row and column indices as one would do when inverting a matrix.

Program 2

Implement these tasks in your Python program that you name `program2.py`:

- The rows of data in the text file, `program2.txt`, each contains two numbers. Create a two-element tuple with each row of data and put those tuples into a list: that is, create a list of tuples. Use the variable `list_tup` to represent this list of tuples in your program. Interpreting these tuples as geographical location coordinates in the format of (*x*,*y*), the Euclidean distance between two tuples, (x_1,y_1), and (x_2,y_2), is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.
- Use this datum as a reference for this next task: `(4,4)`. Write Python code to evaluate the distance of each tuple in the `list_tup` list from the reference location `(4,4)`. Create a new list of tuples into which you put each of the tuples from `list_tup` whose Euclidean distance is less than or equal to 2 units from the reference point `dict_ref`.
- Print out the list of tuples satisfying the criterion above as well as the number of tuples that satisfy that criterion.

Program 3

Implement this task in your Python program that you name `program3.py`:

- Create a variable, which is a list of integers from 0 to 5000.
- Write a list comprehension statement that filters the list above and retains only elements that are evenly divided by 5 and 8. ("Evenly divided" means that you can divide a number by 5 or 8 and there is no remainder.)
- Also, include a statement that computes the number of elements in the filtered list.
- Print the list that results from the list comprehension and the count of the elements contained therein as described in the step above.