COMPUTING LAB - II
ADVANCED SYSTEM SOFTWARE LAB - CSE 5261
MTech - CSE

Week - 2 Basics of Python Programming

Lab Exercises:

1) Write a python program that -

a) creates the list [1,11,111,1111,...,111...1], where the entries have an ever increasing number of ones, with the last entry having 100 ones.

b) finds all pairs of six-digit palindromic numbers that are less than 20 apart. One such pair is 199991 and 200002.

c) asks the user to enter a date in the format mm/dd/yy and converts it to a more verbose format. For example, 02/04/77 should get converted into February 4, 1977.

2) Write a program that asks the user to enter a word. Rearrange all the letters of the word in alphabetical order and print out the resulting word. For example, abracadabra should become aaaaabbcdrr.

3) Create a 5 × 5 list of numbers. Then write a program that creates a dictionary whose keys are the numbers and whose values are the how many times the number occurs. Then print the three most common numbers

4) Write a Python program that uses a dictionary that contains ten user names and passwords. The program should ask the user to enter their username and password. If the username is not in the dictionary, the program should indicate that the person is not a valid user of the system. If the username is in the dictionary, but the user does not enter the right password, the program should say that the password is invalid. If the password is correct, then the program should tell the user that they are now logged in to the system.

5) Suppose you are given the following list of strings:

L = ['aabaabac', 'cabaabca', 'aaabbcba', 'aabacbab', 'acababba']

Patterns like this show up in many places, including DNA sequencing. The user has a string of their own with only some letters filled in and the rest as asterisks. An example is a**a****. The user would like to know which of the strings in the list fit with their pattern. In the example just given, the matching strings are the first and fourth. Write a program to find the strings that match a user-entered string.

6) You are given a file namelist.txt that contains a bunch of names. Some of the names are a first name and a last name separated by spaces, like George Washington, while others have a middle name, like John Quincy Adams. There are no names consisting of just one word or more than three words. Write a program that asks the user to enter initials, like GW or JQA, and prints all the names that match those initials. Note that initials like JA should match both John Adams and John Quincy Adams.

7) You are given a file called students.txt. A typical line in the file looks like:

Walter melon melon@email.msmary.edu 555-3141

There is a name, an email address, and a phone number, each separated by tabs. Write a Python program that reads through the file line-by-line, and for each line, capitalizes the first letter of the first and last name and adds the area code 301 to the phone number. Your program should write this to a new file called students2.txt. Here is what the first line of the new file should look like:

Walter Melon melon@email.msmary.edu 301-555-3141

8) Write a function called closest that takes a list of numbers L and a number n and returns the largest element in L that is not larger than n. For instance, if L=[1,6,3,9,11] and n=8,then the function should return 6, because 6 is the closest thing in L to 8 that is not larger than 8.

9) The digital root of a number n is obtained as follows: Add up the digits n to get a new number. Add up the digits of that to get another new number. Keep doing this until you get a number that has only one digit. That number is the digital root. For example, if n = 45893, we add up the digits to get 4 + 5 + 8 + 9 + 3 = 29. We then add up the digits of 29 to get 2 + 9 = 11. We then add up the digits of 11 to get 1 + 1 = 2. Since 2 has only one digit, 2 is our digital root.
Write a function that returns the digital root of an integer n. [Note: there is a shortcut, where the digital root is equal to n mod 9, but do not use that here.]

10) Write a function called first_diff that is given two strings and returns the first location in which the strings differ. If the strings are identical, it should return -1.

Additional Exercises:

1) Write a Python script, which is repeatedly ask the user to enter a team name and the how many games the team won and how many they lost. Store this information in a dictionary where the keys are the team names and the values are lists of the form [wins, losses].

(a) Using the dictionary created above, allow the user to enter a team name and print out the team's winning percentage.

(b) Using the dictionary, create a list whose entries are the number of wins of each team.

(c) Using the dictionary, create a list of all those teams that have winning records.

2) Write a program that repeatedly asks the user to enter product names and prices. Store all of these in a dictionary whose keys are the product names and whose values are the prices. When the user is done entering products and prices, allow them to repeatedly enter a product name and print the corresponding price or a message if the product is not in the dictionary.

3) Write a function called verbose that, given an integer less than 1015, returns the name of the integer in English. As an example, verbose(123456) should return one hundred twenty-three thousand, four hundred fifty-six.