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## CSCI 1380 Homework 2

**Due Date: see the course webpage**  
**Instructor: Xiang Lian**

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### Assignment:

- (1) Design a program to solve the following problem.
- (2) Enter and successfully run the program in the Visual C++ environment

### Problem (100 points):

Write a C++ program that inputs a single letter and prints out the corresponding digit on the telephone. The letters and digits on a telephone are grouped this way:

2 = ABC	4 = GHI	6 = MNO	8 = TUV
3 = DEF	5 = JKL	7 = PRS	9 = WXY

No digits correspond to either Q or Z. For these two letters, your program should print a message indicating that they are not used on a telephone. If a letter in lower case or a non-alphabetic character is entered, your program should indicate that there is no matching digit for such character.

The input of your program should be:

```
Please enter a single letter in upper case, and I will tell you what
the corresponding digit is on the telephone:
```

Examples of outputs are:

Supposing Z was entered: Sorry, but there is no digit on the telephone that corresponds to Z.

Supposing b was entered: Sorry, but b is an invalid input.

Supposing A was entered: The digit 2 corresponds to the letter A on the telephone.

Each program must have the following comments at the top:

```
/******
* Program Name:      hwTwoMain.cpp
* Author:           ??????
* UTPA SID:         ??????
* Due Date:         03/01/2011
* Course:           CSCI 1380
* HW Assignment:    Two
*
* Description:      Here is a brief description of the program.
*                  [Add your description here.]
*****/
```

Show that your program works by using at least 5 test cases, illustrating that all three cases listed above are produced. You may only use the C++ statements we have covered. That is, do not use looping for this program.

Have your program send the output to both the screen and an output file. To have all the outputs appear in the same output file, use the following to open the output file

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outFile.open("hw2Output.txt", ios::app);
```

Note that you do not have to use the names *outFile* or *hw2Output.txt*.

Make sure that your name gets printed in the output file.

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**Extra Bonus Part A (10 points).** This part is optional. If you can get it done, you will receive 10 extra points.

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Modify the program of Assignment 2 that you have completed so that it can repeatedly encode a list of letters using their corresponding numbers on phone. If a letter is entered in lower case, then change it to upper case for encoding. If a letter does not have a corresponding number on the phone, then use 1 instead. Say, if the list of letters is “dog likes cat”, the encoded numbers are “3641545371228”. Notice that we used two 1’s to encode two spaces in the list. The program does the following:

- (1) It asks the user for a list of letter and displays the encoded numbers to the user.
- (2) It then asks the user whether he/she wants to play with program again.
- (3) If yes, then it repeats (1) and (2). If no, it stops.

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**Extra Bonus Part B (20 points).** This part is optional. If you can get it done, you will receive 20 extra points.

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Once you have completed Extra Bonus Part A, you can add another component to really encode and decode a list of letters using numbers on the phone. The problem with the previous encoding is that several letters may share the same number. Say, A, B and C all correspond to number 2. This makes it impossible to decode a list of numbers. Say, “dog” is encoded as “364”. However, given “364”, we cannot uniquely decode “dog” from it. There are 27 possible results for decoding.

We propose the following new method to do encoding: For each letter we use two numbers to encode it. For example, since A, B and C corresponds to 2, we can encode A as 21, B as 22, and C as 23. Following this method, “dog” is encoded as “316341”. The decoding result is just “dog”.

Modify the Extra Bonus Part A to implement the above proposed new encoding method. The new program shall be able to encode a list of letters into a list of numbers. And, given a list of numbers in the right format of the encoding, it shall decode the original list of letters.

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### **Submission guidelines**

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- Submit printed copies of all the programs and their execution results for given test data to TA.
- Submit electronic copies of all the programs that you wrote for this assignment via [Blackboard](#).
- Both paper and electronic copies must be submitted before or in class by the due date posted on the course webpage.
- Note that this assignment must be completed by each student individually (no teamwork please!).