**AP Computer Science - Final Exam Hierarchy**

In order to pass your final exam, you must pass several challenges. You cannot move from Level E until your Level E program is completed. Each program increases in difficulty. Each time you complete a program, you are awarded a letter grade higher on your final exam.

**Level E - WordMan**

Description: WordMan is a superhero. His power is the ability to change altered words back to their original. In this program, the user provides two words, which are the same length, with just one letter difference between them. The program will detect the changed letter and change it back to the original. The changed letter can appear anywhere in the word.

Example: Use enters Dixon and Nixon.

Expected output:

WordMan detects D was changed to N. Nixon is changed back to Dixon.

**Level D - AlphabetHistogram**

A histogram is a bar graph in which the area of each bar is proportional to an item's frequency of occurrence.  Write a program to generate a histogram of the letters (A-Z) from a user's input.

The program must display on screen a vertical histogram representing the occurrences of each letter of the alphabet. All letters will be uppercase (no need to check), and your program may ignore numbers, spaces, punctuation, etc. Lines will be no longer than 80 characters, and if a letter occurs more than 32 times the histogram should stop at 32.

Sample input: THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG THIS IS AN EXAMPLE OF HOW TO TEST YOUR HISTOGRAM PROGRAM.  YOU CAN USE THIS EXAMPLE.

Expected Output:

              \*
                \*
      \*         \*
      \*         \*    \*
  \*   \*         \*   \*\*
  \*   \*  \*      \*  \*\*\*
  \*   \*  \*\*   \* \*  \*\*\*\*
  \*   \*  \*\*   \* \*\* \*\*\*\*
  \*   \* \*\*\*  \*\*\*\*\* \*\*\*\*  \*\*
  \* \* \*\*\*\*\*  \*\*\*\*\* \*\*\*\* \*\*\*
  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*
  ABCDEFGHIJKLMNOPQRSTUVWXYZ

**Level C - AnagramDetector**

An anagram is a word or phrase obtained by rearranging the letters of another word or phrase. For example “Neo” is an anagram of “One”, “schedule” is an anagram of “held cues”, and “never diets” is an anagram of “desert vine”. Write a program which can determine if two strings are anagrams.

Your program should ignore punctuation, digits, and all other non-letters.

Sample inputs: dormitory, dirty room

 victory, viceroy

Expected output -

 dormitory is an anagram of dirty room

 victory is not an anagram of viceroy

**Level B - MagicStar**

This is a magic number puzzle.  You are given a six-pointed star as shown in the illustration below.  You must assign a unique value from 5 to 16 at each line intersection in the star, with A = 5 always.  Your goal is to find a single solution to the program that will result in all six lines summing up to 42.  For instance, A + G + H + C = 42, C + I + J + E = 42 etc.

The program screen output should look like what follows.  The program should output a period (“.”) for every 100,000 possible solutions checked. It will find a single solution and output that solution in the format shown below. A is always equal to 5, but the values 6 through 16 will be randomly and uniquely assigned to points B through L.

Expected Output:

*………………*

Solution: A=5 B=7 C=6 D=8 E=13 F=9 G=16 H=15 I=12 J=11 K=14 L=10

It took 283256 attempts.

**Level A - SudokuSolver**

The game of Sudoku is quite simple – given a 9x9 grid with some spaces already populated with numbers, you place the

digits 1-9 into the remaining spaces. There are only two rules:

Each row and column must contain each of the digits 1-9 exactly once.

Each 3x3 region of the grid must contain each of the digits 1 through 9 exactly once.



You will be supplied with nine lines of input that will represent the unfinished Sudoku puzzle. Each line will hold 9 characters, which represents the digits found on this row of the puzzle. A capital X will be used to represent an blank (unknown) number in the puzzle. The below syntax shows the text representation of the above puzzle.

X57XXX9XX

X8X15X6XX

X6XX2X3X5

XXX8X2XX4

1XX9X6XX2

3XX5X4XXX

5X4X9XX8X

XX2X61X9X

XX9XXX47X

Your program should output the solution, nicely formatted into the console.

After each level, you will get your program checked by Mr. Dixon and he will "graduate" you to the next level.