Assignment 3, Nov.22.2018   **Due Date: Dec.20.2018**

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1   Write a code about guessing a number:
- Guess the number game:
- Task: Enter a 4-digit number, in a range of [1023 -9876] having each of the digits different from others to guess the random target number given by the computer
    - -2 means 2 numbers are guessed correctly, but they are not in the right place
    - +2 -2 means 4 numbers are guessed correctly; 2 of them at the right place, and 2 of them are not at the right place
    - +4 means 4 numbers are guessed correctly, they are at the right place.

Screen outputs will be will be as following

```
Welcome to "guess the number game"
Task: Enter a 4-digit number, in a range of [1023 -9876] having each of the digits
different from others to guess the random target number given by the computer

Enter a 4-digit number:
1234
 -1
Enter a 4-digit number:
1236
 -2
Enter a 4-digit number:
2643
+2
Enter a 4-digit number:
2678
+2 -1
Enter a 4-digit number:
2680
+4
Congratulations ! you've reach the target number in 5 attempts.
```

Pseudo-code is:
  I.   Create a 4-digit number in a range of [1023 -9876], having each of the digits different from others (there should be a check for these properties, if the number is not acceptable, <u>let the computer </u>to decide on a suitable target number),
 II.   Enter a four digit number to find the target number,
III.   Check the number, if the number is acceptable compare it with the target number, otherwise inform the user to <u>enter a suitable number </u>(comparison results should be in such forms: +2 -2 , +1, -3 +1, +4)
 IV.   Display the comparison result,
  V.   After the comparison if it is +4, stop the game, otherwise enter a new number and execute steps II, III, IV),
 VI.   Display the number of attempts towards guessing the random target number.

Hints
-   Use rand( ), srand( ), time( ) functions and related header files for the target number,
-   This target number should be known only by the computer, not by the user,
-   You have the split numbers into digits (e.g. targetNumber=1234 → targetNumberDigits[4]={1, 2, 3, 4}
-   You may use variables such as: targetNumber, guessNumber, guessAttempts, guessNumberDigits[4], targetNumberDigits[4], nDigitsAtRightPlace, nDigitsAtWrongPlace, targetNumberIsSuitable, guessNumberIsSuitable, etc.
-   The codes may be in the form of:

```
Create a random target number
Check this number
while(! targetNumberIsSuitable)
```
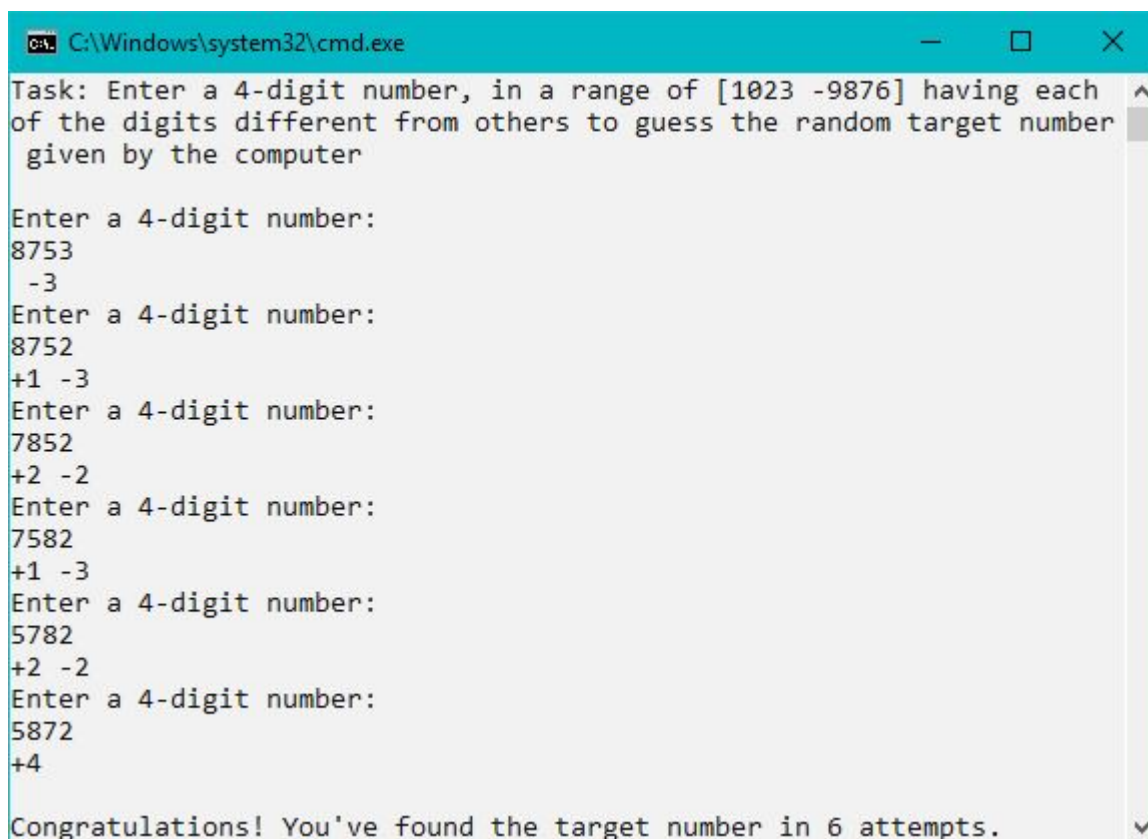
```
{
        Create a random target number
        Check this number
}


while(nDigitsAtRightPlace!= 4)
{
        Enter the guess number
        Check this number
        while (! guessNumberIsSuitable)
        {
                Enter the guess number
                Check this number
        }
        Compare two numbers
        Display the evaluation result
}
```

2   Compile your codes, run your application file, and save the screen image of the shell window.

3   Submit the prints out of your files : guessNumber.cpp, and an image of one of your runs

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a)   Complete and submit your assignment yourself.

b)   The due date is firm and assignment can be submitted by the **end of this date.** "NO OTHER EXCEPTION"

c)   Print out your document and hand it in

```
C:\Windows\system32\cmd.exe                                    —    □    ✕

Task: Enter a 4-digit number, in a range of [1023 -9876] having each
of the digits different from others to guess the random target number
 given by the computer

Enter a 4-digit number:
8753
 -3
Enter a 4-digit number:
8752
+1 -3
Enter a 4-digit number:
7852
+2 -2
Enter a 4-digit number:
7582
+1 -3
Enter a 4-digit number:
5782
+2 -2
Enter a 4-digit number:
5872
+4

Congratulations! You've found the target number in 6 attempts.
```

```cpp
 1  #include <iostream>
 2  #include <ctime>
 3  using namespace std;
 4  int *targetNumberDigits, *guessNumberDigits;
 5  int guessAttempts = 0;
 6  int *NumberToDigits(int);
 7  bool IsSuitable(int*);
 8  int RightPlaceCompare();
 9  int WrongPlaceCompare();
10  int PlaceCompare();
11  void PrintTargetNumber();
12  int main()
13  {
14      srand(time(0));
15      int guessNumber;
16      do
17      {
18          targetNumberDigits = NumberToDigits(rand() % 8854 + 1023);
19      } while (!(IsSuitable(targetNumberDigits)));
20      cout << "Welcome to \"guess the number game\"\nTask: Enter a 4-digit      ⮡
        number, in a range of [1023 -9876] having each of the digits different   ⮡
        from others to guess the random target number given by the computer\n\n";
21      //PrintTargetNumber();
22      do
23      {
24          cout << "Enter a 4-digit number:\n";
25          cin >> guessNumber;
26          guessNumberDigits = NumberToDigits(guessNumber);
27      } while (PlaceCompare() != 4);
28      cout << "\nCongratulations! You've found the target number in " <<        ⮡
        guessAttempts << " attempts.\n";
29      return 0;
30  }
31  int *NumberToDigits(int Number)
32  {
33      int *NumberDigits = new int[4];
34      for (int i = 3; i > -1; i--)
35      {
36          NumberDigits[i] = Number % 10;
37          Number = (Number - NumberDigits[i]) / 10;
38      }
39      return NumberDigits;
40  }
41  bool IsSuitable(int *NumberDigits)
42  {
43      for (int i = 0; i < 3; i++)
44          for (int j = i + 1; j < 4; j++)
45              if (NumberDigits[i] == NumberDigits[j])
46                  return false;
47      return true;
48  }
49  int RightPlaceCompare()
50  {
51      int nDigitsAtRightPlace = 0;
52      for (int i = 0; i < 4; i++)
53          if (targetNumberDigits[i] == guessNumberDigits[i])
```

```
54               nDigitsAtRightPlace++;
55       return nDigitsAtRightPlace;
56 }
57 int WrongPlaceCompare()
58 {
59     int nDigitsAtWrongPlace = 0;
60     for (int i = 0; i < 4; i++)
61     {
62         for (int j = 0; j < i; j++)
63             if (targetNumberDigits[i] == guessNumberDigits[j])
64                 nDigitsAtWrongPlace--;
65         for (int j = i + 1; j < 4; j++)
66             if (targetNumberDigits[i] == guessNumberDigits[j])
67                 nDigitsAtWrongPlace--;
68     }
69     return nDigitsAtWrongPlace;
70 }
71 int PlaceCompare()
72 {
73     guessAttempts++;
74     int nDigitsAtRightPlace = RightPlaceCompare();
75     int nDigitsAtWrongPlace = WrongPlaceCompare();
76     if (IsSuitable(guessNumberDigits))
77     {
78         if (nDigitsAtRightPlace != 0)
79             cout << '+' << nDigitsAtRightPlace;
80         if (nDigitsAtWrongPlace != 0)
81             cout << ' ' << nDigitsAtWrongPlace;
82     }
83     else
84         cout << "The entered number is not suitable.";
85     cout << endl;
86     return nDigitsAtRightPlace;
87 }
88 void PrintTargetNumber()
89 {
90     cout << "Target number is: ";
91     for (int i = 0; i < 4; i++)
92         cout << targetNumberDigits[i];
93     cout << endl;
94 }
```