Deliverable 3:

The program will ask for a number in hexadecimal format and will decide if this number is "happy". Also, the program will develop some operations with the results of the performed iterations.

The program must meet next requirements completed with examples:

1) Programs starts asking for a number in hexadecimal format. The number of symbols of the number is between 1 and 20. Correct symbols are: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E y F.
    a. Only digits and (a, b, c, d, e, f, A, B, C, D, E, F) are accepted. Rest of characteres must be ignored and not shown. ENTER (ascii 13) is accepted to end the number.
    b. Maximum number of characters is 20 (using a DEFINE directive this value can be changed).
    c. Minimum number of correct characters is 1.
    d. If number entered is 0 (just one zero, or two zeros, or …), a message saying the number is 0 will be shown, and the number will be asked for again.

2) Once the string is correct, it will be shown, eliminating leading zeros, and in case of non numerical symbols these must be uppercase. For instance, if 000abc0123 is entered, the program will show ABC0123.

3) The program asks the user to press a key to start to show the iterations (sum of the squares in hexadecimal format, see note below after the requirements).

    a. Once the first iteration is shown, next iterations can be shown if user press any key but SPACE (ascii 32). In this case the program will end with a message.
    b. During the process, if the number is happy (iteration value is 1) a message will be shown.
    c. Maximum number of iterations is 100, using a DEFINE directive (ITERATIONS). A message will be shown if this number is reached.
    d. While calculating and showing iterations, strings with resulting numbers must be store in a matrix (100 rows and 5 columns) First four columns for strings from 0000 to FFFF. Fifth character is '\0'. The variable should be declared as matrix[ITERATIONS][5].

4) The program asks the user to press a key to show the matrix (bidimensional array) with the iterations.

5) The program asks the user to press a key to know if any number (string) is repeated, and how many times. If any number is repeated the program will conclude the number is unhappy. If no number is repeated no conclusions can be taken.

6) The program asks the user to press a key to show which symbols (from 0 to F) are in the iterations. In case of zero symbol the program will show how many zeros are leading in the string.

7) The program asks the user to press a key to show lowest and biggest numbers in the iterations.

8) Pressing any key the program will end.

NOTE: If entered number is A34F, first iteration result will be $A^2 + 3^2 + 4^2 + F^2 = 10^2 + 3^2 + 4^2 + 15^2 = 100 + 9 + 16 + 225 = 350$, in hexadecimal 15E (015E).

Example 1:
Deliverable 3

Enter a string: 000000000

String is 0. Enter a string: 0000ab12c

String is AB12C

Press a key to start the iterations:

Iteration 1: 0172
Iteration 2: 0036
Iteration 3: 002D
Iteration 4: 00AD
Iteration 5: 010D
Iteration 6: 00AA
Iteration 7: 00C8
Iteration 8: 00D0
Iteration 9: 00A9

The user decided to stop the iterations

Press a key to show the matrix with the iterations:

0172
0036
002D
00AD
010D
00AA
00C8
00D0
00A9

Press a key to know if any number is repeated:

No number is repeated, no conclusions can be taken

Press a key to show which symbols are in the iterations:
---
18 symbols 0, 16 leading on the left
2 symbols 1
2 symbols 2
1 symbols 3

1 symbols 6
1 symbols 7
1 symbols 8
1 symbols 9
4 symbols A
1 symbols C
4 symbols D

Press a key to show lowest and biggest numbers:

Lowest number is 002D
Biggest number is 0172

Press a key to end the program

Example 2:
Deliverable 3

Enter a string: A9

String is A9

Press a key to start the iterations:

Iteration 1: 00B5
Iteration 2: 0092
Iteration 3: 0055
Iteration 4: 0032
Iteration 5: 000D
Iteration 6: 00A9
Iteration 7: 00B5
Iteration 8: 0092
Iteration 9: 0055
Iteration 10: 0032

The user decided to stop the iterations

Press a key to show the matrix with the iterations:

00B5
0092
0055
0032
000D
00A9
00B5
0092
0055
0032

Press a key to know if any number is repeated:

String 00B5 is repeated 2 times
String 0092 is repeated 2 times
String 0055 is repeated 2 times
String 0032 is repeated 2 times
Unhappy number because there are repeated strings

Press a key to show which symbols are in the iterations:
---
21 symbols 0, 21 leading on the left
4 symbols 2
2 symbols 3
6 symbols 5
3 symbols 9
1 symbols A
2 symbols B
1 symbols D

Press a key to show lowest and biggest numbers:

Lowest number is 000D
Biggest number is 00B5

Press a key to end the program

Example 3:
Deliverable 3

Enter a string: AAA

String is AAA

Press a key to start the iterations:

Iteration 1: 012C
Iteration 2: 0095
Iteration 3: 006A
Iteration 4: 0088
Iteration 5: 0080
Iteration 6: 0040
Iteration 7: 0010
Iteration 8: 0001
Happy number!

Press a key to show the matrix with the iterations:

012C
0095
006A
0088
0080
0040
0010

```
0001

Press a key to show which symbols are in the iterations:
--------------------------------------------------------------------------------
19 symbols 0, 16 leading on the left
3 symbols 1
1 symbols 2
1 symbols 4
1 symbols 5
1 symbols 6
3 symbols 8
1 symbols 9
1 symbols A
1 symbols C

Press a key to show lowest and biggest numbers:
----------------------------------------------------------------
Lowest number is 0001
Biggest number is 012C

Press a key to end the program
```

Global variables are not allowed!