NAME: FIRST LAST

SEAT   ROW   NUMBER

1. (30 points) Answer the following questions.
   (1) Declare an array of chars called grades with size 5. Initialize the elements, from the first one to the last one, to be 'a', 'b', 'c', 'd', 'f'.

   (2) Declare function foo whose input parameter is an int (pass by value) and return is a string. You just need to write the function header, no implementation is needed.

   (3) Write code to generate a random floating point number in [-1, 2].

   (4) Given array of strings as follows
       string greetings[] = {"Hi", "Hello", "Great!"};
       What is the value for greetings[1][2]?

   (5) Write a command to compile hello.cpp in command line.

(6) What is the output of the following code?
```cpp
int value = 0;
for (int i = 3; i <= 6; i += 2)
{
    value += i;
    cout << value << endl;
}
```

(7) Write code to calculate the square root of $b^2 - 4ac$, where a, b, c are properly declared and initialized. Hints: you may use sqrt function.

(8) If m is 5 and n is 1, what is the value of 1.0 / 2 * m * n?

(9) Suppose n is an int >= 100, write code to extract its last three digits. For example, suppose n is 121, after your code, you get 121; if n is 1265, then your code gets 265.

(10)   What is the output of the following code?

```cpp
#include <iostream>
using namespace std;

void foo(int size);

int main()
{
  foo(4);
  return 0;
}

void foo(int size)
{
  for (int num = size; num >= 1; num--)
  {
    for (int i = 0; i < size - num; i++)
      cout << "*";
    for (int i = 0; i < num; i++)
      cout << "#";
    cout << endl;
  }
}
```

```
####
*###
**##
***#
```

2. (45 points) Short programming exercises
   (2.1) Write code in main that generate 36 random integers in [10, 100], tally how many of grades are larger than or equal to 90, and how many grades are between 60 (included) and 90 (not included), and how many grades are less than 60.

(2.2) Define a function, sort two given strings according to their lengths in **non-ascending** order (that is, the first string has no fewer letter than the second one), return type is void. For example, suppose string a is "seller" (six letters) and string b is "buyer" (five letters), after calling this function, a and b are not changed. Suppose a is "good" and b is "better", then after the function, a is "better" and b is "good".

(2.3) Write code.
Create an ifstream object fin that reads text file named data.txt.

```
```

Write code to ignore the first line of data.txt.
Hints: you might want to use ignore method of file stream.

```
istream& ignore (streamsize n = 1, int delim = EOF);
```
Extract and discard characters
Extracts characters from the input sequence and discards them, until either *n* characters have been extracted, or one compares equal to *delim*.

```
```

Suppose data.txt has only a column of decimal numbers. Write code to find out and print the average.

```
```

Call close method of fin.

```
```

3. (10 points) **Define a function**, for a given string str, return true if all its characters are only letters '0', '1', '2', otherwise, return false.

4. (15 points) Define a function, for a given int, return how many digits are 3. For example, if the given integer is 21, then the number of 3's is 0, if the given integer is -300, then the number of 3's is 1.