**Lab work – functions**

Every function **prototype/title-line** must have the following 3 things:

i) Function's name

ii) Function's return type (in CS111: int, double, bool, char, string, void)

iii) A list of parameters (it can be an empty list with no parameter all the way up to a large amount)

Here are some examples:

```cpp
double area(int radius);
bool greaterThan(int a, int b);
void do_something();
```

1) What should the function's return type be?

   a) 

   ```cpp
   void print_col(int n) {
   for (int r = 1; r <= n; ++r)
     cout << "*" << endl;
   return; //Is this optional?
   }
   ```

   b) 

   ```cpp
   double force(double m, double a) {
   return m * a;
   }
   ```

Note: In a C++ function, you can only use the return type to return at most one “thing” (Be it a simple data type such as an int or a char. Or it can be an entire array or a more complex object.) You cannot pass more than 1 thing back to the calling function.

2) When you answer the questions about title lines in the exams, you should have a mental checklist similar to the following:

   a) What is the name of the function. Write it down.

   b) How many input parameters are there? (You must write out the data type for every parameter even if they are the same type. Also, each input parameters must be separated by a `comma`.)

   - Do I need to use passed by reference for some of the inputs?

   c) What is the return type of the function? Is the function returning a value that will be used?

   For example:
   
   **Assignment:**
   
   ```cpp
   int x = fun1(5);
   ```

   **Printing:**
   
   ```cpp
   cout << fun1(x) << endl; //Print 7
   ```

   **As part of the conditional statement:**
   
   ```cpp
   while (fun1(9) == 7) {//…
   if (fun2(x)) {//…
   ```

   If a function is not returning a value, use void as the return type.
Go through plenty of practice examples in order to master this part of the exam.

Write **title lines** for the functions that are called by the following main program. **Do not supply the blocks for the functions.**

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

int main() {
    int x = 2;
    string s; char c = 'A';
    cout << sqrt(x + 1.5) << endl;       // (a)
    cout << allTrue(x, 5) << endl;       // (b) prints FALSE
    biggest(3.14, 2.718, 1.5);           // (c) prints 3.14
    s = asString(c); cout << s << endl;   // (d) prints A
    if (mystery(s) == x) cout << "Bye";  // (e)
    return 0;
}
```

3) **Write a complete C++ program that does the following:**

   a) The program asks user to enter a positive integer n < 10. If the input value is incorrect, the program repeatedly force user to input value until n is within the expected value.

   b) The program then invoke (calls) function fun1() that does the following:

      • The heading of the function is void fun1(int n)

      • The function prints a square with n rows and n columns using the letter X on or above the main diagonal and the letter O below it.

For example, if the user enters 4 for n the output is as follows:

```
XXXX
OXXX
OOXX
OOOX
```