Lab work – functions

1) Given the following function prototype/title-line:

    double area(int radius);

   i) What is the function's name? area
   ii) What is the function's return type? double
   iii) What parameter(s) does the function take? int radius

2) Given the following function prototype/title-line:

    bool greater_than(int a, int b);

   i) What is the function's name? greater_than
   ii) What is the function's return type? bool
   iii) What parameter(s) does the function take? int a, int b

3) Given the following function prototype/title-line:

    void do_something();

   i) What is the function's name? do_something
   ii) What is the function's return type? void
   iii) What parameter(s) does the function take? None

4) Given an almost-complete function:

    _______ print_col(int n) {
        for (int r = 1; r <= n; ++r)
            cout << "*" << endl;
        return;
    }

   What should the function's return type be? void

5) Given an almost-complete function:

    _______ force(double m, double a) {
        double f = m * a;
        return f;
    }

   What should the function's return type be? double
6) Write a complete C++ program which carries out the following tasks:
   • Ask the user for two integers, a and b.
   • If a is greater than b, exit the program.
   • Print a random number (using the rand function) between a and b, inclusive. The formula is as follows:

     \[
     \text{rand()} \% (b - a + 1) + a
     \]

     Amount of numbers from a to b.

```cpp
#include <iostream>
#include <cstdlib> // srand, rand
#include <ctime> // time
using namespace std;

int main() {
    int a, b;
    cout << "Please enter two integers a and b where a < b: ";
    cin >> a >> b;

    if (a > b) {
        cout << "You enter a value where a > b. Bye!" << endl;
        return 0;
    }

    cout << "Random number between " << a << " and " << b << ": ";
    cout << rand() % (b - a + 1) + a << endl;
    return 0;
}
```
7) More practice on using `rand()`: Print the following numbers to the screen:
   a) A random number between 1000 and 9999.
   b) 10 random numbers between 10 and 20.
   c) 5 random numbers between -1 and -9.
   d) 5 random 3-digit integers.

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

int main() {
    srand(time(0));

    cout << "a: \n";
    cout << rand() % (9999 - 1000 + 1) + 1000 << endl;

    cout << endl << "b: \n";
    for (int i = 0; i < 10; i++)
        cout << rand() % (20 - 10 + 1) + 10 << " ";

    cout << endl << "c: \n";
    for (int i = 0; i < 5; i++)
        cout << rand() % (-1 + 9 + 1) - 9 << " ";

    cout << endl << endl << "d: \n";
    for (int i = 0; i < 5; i++)
        cout << rand() % (999 -100 + 1) + 100 << endl;
    return 0;
}
```
8) (prac1.pdf) Write a complete C++ program that does the following.

a) It repeatedly asks the user to enter an integer.

b) If the entered number is negative, the word “Negative” is printed and the program terminates.

c) Otherwise the square root of the number is calculated and the nearest integer to this square root is printed.

Here is an example of how the program should work:

Enter an integer: 100
10
Enter an integer: 97
10
Enter an integer: 101
10
Enter an integer: -100
Negative

#include <iostream>
#include <cmath>
using namespace std;

int main() {
    int n = 0;

    while (n >= 0) {
        cout << "Enter an integer n: ";
        cin >> n;
        if (n < 0) {
            cout << "Negative" << endl;
            return 0;
        }
        cout << (int) (sqrt((double) n) + 0.5) << endl;
    }
    return 0;
}
9) Write a program which does the following:
   • Ask the user for the radius of a circle.
   • Write and call a function to calculate the circumference of a circle given a radius. The prototype (title-line) is as follows:

   
   double circumference(double radius);

   
   The formula for the circumference of a circle with radius $r$ is $C = 2\pi r$. You can approximate $\pi$ as 3.14.

   
   Sample I/O #1 (User input is in **bold**)
   What is the radius of the circle? 5
   The circumference is 31.4

   
   Sample I/O #2 (User input is in **bold**)
   What is the radius of the circle? 3.5
   The circumference is 21.98

   
   //Solution 1:
   #include <iostream>
   using namespace std;

   double circumference(double radius) {
       double c = 2 * 3.14 * radius;
       return c;
   }

   int main() {
       double r;
       cout << "What's the radius? ";
       cin >> r;

       double x;
       //store result in variable x
       x = circumference(r);
       cout << "Circumference: " << x << endl;

       return 0;
   }

   //Solution 2:
   #include <iostream>
   using namespace std;

   double circumference(double radius);

   int main() {
       double r;
       cout << "What's the radius? ";
       cin >> r;

       double x;
       //store result in variable x
       x = circumference(r);
       cout << "Circumference: " << x << endl;

       return 0;
   }

   double circumference(double radius) {
       double c = 2 * 3.14 * radius;
       return c;
   }