**This set of problems should be attempted during the first lab session.**

**The marked components are highlighted with \* and should be submitted by 29//11.**

**In general always write your name and date of creation as comments in the files and try to be “user friendly” when you write the code:**

* **Add comments on the code to remember yourself and the other what the code does**
* **Manage the possible errors in the input given by the user**

1. Create a program to calculate the power of a number without using the function pow or a loop. The base and exponent should be asked to the user and should be integer.
   1. After that extend the program adding an additional function that takes the same number of arguments (can have different type) of the previous one and have the same name but calculate the nth root of the base, where n is the exponent. (Here the function pow could be useful: <http://www.cplusplus.com/reference/cmath/pow/>)
   2. *What should be learn: overloading, functions*
2. **\*** Have you ever played the game mastermind?

Player A selects 4 balls of various colours among 6 choices (RED(R), BLUE(B), GREEN(G), YELLOW(Y), PURPLE(P) and ORANGE(O)), **balls can not be repeated**. Player B tries to guess what player A chose by typing combinations of 4 colours.

For every attempt, player A replies with a black ball for each colour and position guessed correctly and with a white ball for every colour (and not position) correctly guessed by B. The game ends when player B guesses the position and colours of the 4 balls.

* 1. Try to code this, where player A is the computer and the combination is selected randomly (remember that you can’t repeat the same ball more than once). The user should be able to play mastermind with the computer that at every turn should reply with B or W or nothing depending on the combination of colors (letter) given by the user. **Write the code as composed by several functions that are called in main, storing the function into a header file. If in doubt, try writing pseudocode on paper to build up the model for the code.**
  2. Output all the combinations which were used to guess the 4 balls in an output file together with a message containing the number of combinations.
  3. *What to learn: how to output to file, arrays, how to generate random numbers, extensive use of functions, strings, pointers*