**Homework: Using Classes and Objects**

**Problem 1. Leap year**

* Write a program that reads a year from the console and checks whether it is a leap one.
* Use System.DateTime.

**Problem 2. Random numbers**

* Write a program that generates and prints to the console 10 random values in the range [100, 200].

**Problem 3. Day of week**

* Write a program that prints to the console which day of the week is today.
* Use System.DateTime.

**Problem 4. Triangle surface**

* Write methods that calculate the surface of a triangle by given:
  + Side and an altitude to it;
  + Three sides;
  + Two sides and an angle between them;
* Use System.Math.

**Problem 5. Workdays**

* Write a method that calculates the number of workdays between today and given date, passed as parameter.
* Consider that workdays are all days from Monday to Friday except a fixed list of public holidays specified preliminary as array.

**Problem 6. Sum integers**

* You are given a sequence of positive integer values written into a string, separated by spaces.
* Write a function that reads these values from given string and calculates their sum.

*Example:*

| **input** | **output** |
| --- | --- |
| "43 68 9 23 318" | 461 |

**Problem 7.\* Arithmetical expressions**

* Write a program that calculates the value of given arithmetical expression.
* The expression can contain the following elements only:
  + Real numbers, e.g. 5, 18.33, 3.14159, 12.6
  + Arithmetic operators: +, -, \*, / (standard priorities)
  + Mathematical functions: ln(x), sqrt(x), pow(x,y)
  + Brackets (for changing the default priorities): (, )

*Examples:*

| **input** | **output** |
| --- | --- |
| (3+5.3) \* 2.7 - ln(22) / pow(2.2, -1.7) | ~10.6 |
| pow(2, 3.14) \* (3 - (3 \* sqrt(2) - 3.2) + 1.5\*0.3) | ~21.22 |

*Hint: Use the classical*[*Shunting-yard algorithm*](http://en.wikipedia.org/wiki/Shunting-yard_algorithm)*and*[*Reverse Polish notation*](http://en.wikipedia.org/wiki/Reverse_Polish_notation)*.*