Name: NIM:

Problem Set 3
TK2ICM: *Logic Programming* (CSH4Y3)
Second Term 2018-2019

Day, date	:	Tuesday, February 26, 2019
Duration	:	**30 minutes**
Type	:	***open all***, *individual (no cooperation between/among class participants)*

Instruction:

1. You are not allowed to discuss these problems with other class participants.
2. You may use any reference (books, slides, internet) as well as other students who are not enrolled to this class.
3. Use the predicate name as described in each of the problem. **The name of the predicate must be precisely identical**. Typographical error may lead to the cancellation of your points.
4. Submit your work to the provided slot at CeLoE under the file name `PS3-<your_name>.pl`. For example: `PS3-Albert.pl`. Please see an information regarding your nickname at google classroom.

1 Triangle

Problem 1 (50 points) Write the predicate `triangle(X,Y,Z)` that succeeds whenever `X`, `Y`, and `Z` are positive numbers and it is possible to create a triangle whose sides are `X`, `Y`, and `Z`. Some test cases are:

- `?- triangle(1,2,3).` returns **false**.
- `?- triangle(3,4,5).` returns **true**.
- `?- triangle(10,1,1).` returns **false**.
- `?- triangle(1,2,1.7).` returns **true**.
- `?- triangle(-3,-4,-5).` returns **false**.
- `?- triangle(2,1,2).` returns **true**.
- `?- triangle(2,2,0).` returns **false**.
- `?- triangle(1,1,1.4).` returns **true**.
- `?- triangle(-10,-6,8).` returns **false**.
- `?- triangle(3,3,3).` returns **true**.

2 Tribonacci Sequence

Problem 2 (50 points) A Tribonacci sequence is a sequence $\{t_n\}_{n=0}^{\infty}$ recursively defined as follows:

$$t_0 = 0,\ t_1 = 1,\ t_2 = 2, \text{ and } t_n = t_{n-1} + 2t_{n-2} + 3t_{n-3} \text{ for } n > 3.$$

Based on this definition, we have $t_3 = t_2 + 2t_1 + 3t_0 = 2 + 2\,(2) + 3\,(0) = 4$ and $t_4 = t_3 + 2t_2 + 3t_0 = 4 + 2\,(2) + 3\,(1) = 11$. Write a predicate `tribo(N,T)` that succeeds whenever `T` is the n-th Tribonacci sequence. Several test cases are:

- `?- tribo(3,X).` returns

  `X = 4 ;`
  false.

- `?- tribo(4,X).` returns

  `X = 11 ;`
  false.

- `?- tribo(10,X).` returns

  `X = 1892 ;`
  false.

- `?- tribo(11,X).` returns

  `X = 4489 ;`
  false.

- `?- tribo(-1,X).` returns

  false.

(Note: you have to avoid infinite recursive call.)