Student's name:

Information Technology: Final exam 14.01.2015

Question 1

Write a function that calculates the product of two scalars. Write a script that **uses this function** to calculate the value of expression:

$$3x + 2y + xy$$

Question 2

Write a function that calculates the distance between two points (in plane). **Use this function** in a script that checks if rectangle given by the sequence of coordinates of its vertices is a square.

Question 3

Write function that for a given matrix calculates the product of the elements located at the matrix corners.

Question 4

Write a function that for a vector $\vec{x} \in R^N$ finds its minimal positive component.

Question 5

Write a function that for vectors $\vec{a}$ and $\vec{b}$ calculates vector :

$$\frac{\vec{a} + \vec{b}}{2}$$

Question 6

Write Octave function that calculates the sum of N subsequent square numbers starting from 1. Write a program to show usage of this function. Hint: a square number is an integer that is the square of an integer.

Question 7

A sequence is given be the recursive formula:

$$\begin{aligned} x_0 &= 2 \\ x_1 &= 3 \\ x_k &= f(x_{k-1}) + g(x_{k-2}) \text{ for } k \geq 2 \end{aligned}$$

where functions $f(x)$ and $g(x)$ are given by:

$$\begin{aligned} f(x) &= x^2 - 3\sin(x) \\ g(x) &= (1 + x)\cos(x) \end{aligned}$$

Define the above functions in Octave and then **use them** in a program that calculates the value of

$$\sum_{i=1}^{i=100} x_i$$