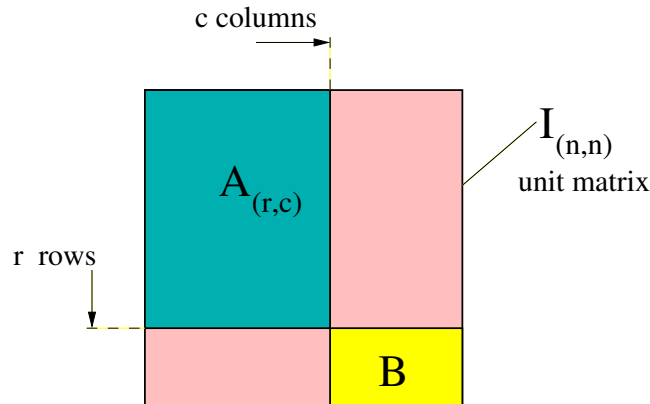


Student's name:

## Information Technology: Final exam 13.02.2015

### Question 1

An unit matrix  $\mathbf{I}$  of size  $(n, n)$  is split at the  $r$ -th row and the  $c$ -th column into two matrices as shown in the figure:



Assuming that the conditions  $n \geq 2$ ,  $r < n$ , and  $c < n$  are always true, write an Octave function that for given  $n, r, c$  returns the matrices  $\mathbf{A}$  and  $\mathbf{B}$ .

Hint: Unit matrix is a square matrix with value 1 for diagonal elements and 0 elsewhere.

### Question 2

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 3

A sequence is given by the recursive formula:

$$x_0 = 2$$

$$x_1 = 3$$

$$x_k = f(x_{k-1}) + g(x_{k-2}) \text{ for } k \geq 2$$

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

$$f(x) = x^2 - 3 \sin(x)$$

$$g(x) = (1 + x) \cos(x)$$

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

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