**Homework lecture 7**

**Introduction to Algorithms**

1. Given a list of real numbers, your task is to write a program to sort these numbers increasingly.

Input: The file ‘numbers.txt’ consists of *n* real numbers separated by spaces or new line characters.

Output: The sorted numbers are written to file ‘numbers.sorted’, two numbers are separated by a space character.

|  |  |
| --- | --- |
| numbers.txt | numbers.sorted |
| 3 5 2  2 1 8 | 1 2 2 3 5 8 |

1. Given a matrix A of *m* rows (numbered from 1 to m) and *n* columns (numbered from 1 to *n*) containing integer numbers, your task is to write a program to find the rectangle with the largest sum.

Input: The file ‘matrix.txt’ consists of *m* + 1 lines. The first line consists of *m* and *n*. The next *m* lines each has *n* integer numbers separated by a spaces.

Output: Write to file ‘matrix.out’ 5 numbers: *r1 c1 r2 r2 s* indicating that the rectangle from (*r1, c1*) to (*r2, c2*) has the largest sum (i.e. *s)*.

Example

|  |  |
| --- | --- |
| Matrix.txt | Matrix.out |
| 3 5  -1 -1 -1 -1 2  -1 2 -2 1 3  2 -1 -1 -1 -1 | 1 4 2 5 5 |

1. Given two integer number X and Y, your task is to write a program to find the greatest common divisor of X and Y using recursion.

Input: Input come from keyboard containing two number X and Y  
Output: Ouput are written to screen contaning the greatest common divisor.

Example:

|  |  |
| --- | --- |
| Keyboard | Screen |
| 10  50 | 10 |

1. Given an integer number *n*, your task is to list all binary number of length *n.*

Input: The number *n* comes from the Keyboard

Output: Binary numbers of length *n* are written to the screen each in one line.

Example:

|  |  |
| --- | --- |
| Keyboard | Screen |
| 3 | 000  001  010  011  100  101  110  111 |

1. Given an integer number *n*, your task is to list all permutations of length *n.*

Input: The number *n* comes from the Keyboard

Output: Permutations of length *n* are written to the screen each in one line.

Example:

|  |  |
| --- | --- |
| Keyboard | Screen |
| 3 | 123  132  213  231  312  321 |