Assignment 2

A Write a MATLAB script Assignment02A_Groupxx.m[1] that computes the ordered list of all proper divisors of a natural number n in two different ways:

(a) By checking all natural numbers between 1 and $n/2$ whether they divide n with zero remainder;

(b) By using the prime factorization of n to generate all divisors directly.

Apply both methods to $n = 2111655$ and to $n = 782515778$, compare the results and the required running time. Remember that many MATLAB functions take vector arguments.

Useful functions: mod, factor, combnk, unique, tic, toc

B Write a MATLAB script Assignment02B_Groupxx.m that solves the following exercise:

- Create three random matrices with the given dimensions:

$$A\,(3 \times 3),\ B\,(3 \times 5),\ C\,(5 \times 3),\ D\,(5 \times 5).$$

- Create the block matrix

$$H = \begin{pmatrix} A & B \\ C & D \end{pmatrix}.$$

- Check that A and D have full rank and that, within rounding errors,

$$H^{-1} = \begin{pmatrix} F^{-1} & -A^{-1}BG^{-1} \\ -G^{-1}CA^{-1} & G^{-1} \end{pmatrix},$$

with

$$F = A - BD^{-1}C,\ G = D - CA^{-1}B.$$

Pack the two scripts in the zip file Assignment02_Groupxx.zip and submit it until March 20, 6pm.

[1] xx is your group number