% Algebra and Geometry, GETIAE, UPC-UPF

% Constrained linear optimization assignment: verification script

% Year 2019/20

%

% Prepared by Kenneth Ros and Jaume Amoros

% Example 1: system with unique exact solution, which complies the

% constrain

A1=[1,3,2;2,0,3;1,-1,1];

b1=[5;-1;3];

M1=30;

'Correct solution'

x1c=A1\b1

residue1c=0

'Tested function answers'

[x1,residue1]=constr\_linear\_opt(A1,b1,M1)

pause

% Example 2: system with unique exact solution, which does not comply the

% constrain; only the last component has to be emptied

A2=A1;

b2=b1;

M2=28;

'Correct solution'

x2c =[22.8614,4.4049,-15.5548]'

residue2c=0.1191

'Tested function answers'

[x2,residue2]=constr\_linear\_opt(A2,b2,M2)

pause

% Example 3: again system with unique exact solution, which does not comply the

% constrain, and more than one component has to be emptied

A3=diag([4,3,2,1]);

b3=[8;6;4;-2];

M3=3.2;

'Correct solution'

x3c =[2,2,1.4967,0]'

residue3c=2.2391

'Tested function answers'

[x3,residue3]=constr\_linear\_opt(A3,b3,M3)

pause

% Exemple 4: incompatible system, where the solution just minimizes the

% residue

A4=[4,3,2,1;

1,5,2,2;

3,6,3,0;

1,0,1,2;

3,8,8,4];

b4=[8;6;4;-2;0];

M4=0.1\*norm(A4\b4) %delta4 = 0.3321, the constrain is tough here

'Correct solution'

x4c =[0.1097,0.2377,0.1842,0.0885]'

residue3c=9.1412

'Tested function answers'

[x4,residue4]=constr\_linear\_opt(A4,b4,M4)

% Missing examples that the user should add:

% Two compatible, undetermined (multiple solutions) linear systems, one

% with an exact solution complying the constraint, another where no exact

% solution satisfies it.