

MATHEMATICS

Tuesday March 14 2017

Fourth exercise class

- 1) Calculate the rank of the following matrices:

$$A = \begin{pmatrix} 0 & 1 & 2 & 3 \\ 1 & 0 & -1 & -2 \\ 2 & 1 & 0 & 1 \end{pmatrix}$$

$$B = \begin{pmatrix} 3 & 2 & 0 \\ -1 & 0 & -2 \\ 1 & 0 & 1 \\ 2 & 1 & 3 \end{pmatrix}$$

$$C = \begin{pmatrix} 1 & -1 & 0 & 1 \\ 0 & 1 & -1 & 0 \\ -2 & 2 & 0 & 2 \\ 1 & 0 & -1 & 1 \end{pmatrix}$$

- 2) Determine the rank of the following matrix on varying the parameter α .

$$A = \begin{pmatrix} \alpha & 1 & 2 \\ 1 & 2 & \alpha \\ 2 & 4 & 4 \end{pmatrix}.$$

- 3) Study the following systems.

$$\text{a) } \begin{cases} x - z = 1 \\ 2y - w = 2 \\ y - 2z = 0 \\ 2y + w + 3z = -1 \end{cases}$$

$$\text{b) } \begin{cases} x + w = 0 \\ 2y - 2z = 4 \\ y + z = 1 \\ y - 3z = 3 \end{cases}$$

$$\text{c) } \begin{cases} y - z = 1 \\ x - w = 0 \\ 2x - z = 0 \\ 2x - y = 1 \end{cases}$$

- 4) Study the following systems on varying the parameters λ and γ .

$$\text{a) } \begin{cases} 2x + z = 2 \\ y - z = 1 \\ 2x + y = \lambda \end{cases}$$

b)

$$\begin{cases} \gamma x + z = 2 \\ y - z = 1 \\ 2x + y = \lambda \end{cases}$$

c)

$$\begin{cases} (2 + \lambda)x + y + 2z = -1 \\ x + \lambda y = 1 \\ -y + \lambda z = 1 \end{cases}$$