Mathematics 2 (Economics, Markets and Finance)

Luciano Battaia - Aregawi Gebremedhin Gebremariam

December 2, 2016

Exercises sheet 5

Solve, if they are consistent, the systems of Exercises 9, 10, 11, 12, 13 of sheet 4.

Exercise 1. *Solve the following system for all values of the parameter $k \in \mathbb{R}$.*

$$\begin{cases} x - ky + 2z = 1 \\ 2x + y = 0 \\ x + 2y - z = 1 \\ x + kz = 1 \end{cases}$$

Exercise 2. *Solve the following system for all values of the parameter $k \in \mathbb{R}$.*

$$\begin{cases} kx - y + 2z = 1 \\ 2x + y = 0 \\ x + 2y - kz = 1 \\ x + z = 1 \end{cases}$$

Exercise 3. *Solve the following system for all values of the parameter $k \in \mathbb{R}$.*

$$\begin{cases} kx + y - z = k \\ x - kz = 2 \\ y + z = 0 \end{cases} .$$

Exercise 4. *Check if the vectors*

$$\vec{v}_1 = \begin{pmatrix} 1 \\ 2 \\ 1 \\ -2 \end{pmatrix}, \quad \vec{v}_2 = \begin{pmatrix} 1 \\ 5 \\ 5 \\ -3 \end{pmatrix}, \quad \vec{v}_3 = \begin{pmatrix} -1 \\ 1 \\ 3 \\ 1 \end{pmatrix}$$

are linearly dependent or independent. If they are dependent write $\vec{v}_1$ as a combination of the others.

Exercise 5. *Check if the vectors*

$$\vec{v}_1 = \begin{pmatrix} 1 \\ 1 \\ 2 \\ 0 \end{pmatrix}, \quad \vec{v}_2 = \begin{pmatrix} 2 \\ 1 \\ 3 \\ -2 \end{pmatrix}, \quad \vec{v}_3 = \begin{pmatrix} 4 \\ 1 \\ 5 \\ 3 \end{pmatrix}$$

are linearly dependent or independent. If they are dependent write $\vec{v}_1$ as a combination of the others.

Exercise 6. *Check if the vectors*

$$\vec{v}_1 = \begin{pmatrix} 1 \\ -1 \\ 2 \end{pmatrix}, \quad \vec{v}_2 = \begin{pmatrix} 4 \\ 1 \\ 8 \end{pmatrix}, \quad \vec{v}_3 = \begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix}$$

are linearly dependent or independent. If they are dependent write $\vec{v}_1$ *as a combination of the others.*

Exercise 7. *Check if the vectors*

$$\vec{v}_1 = \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix}, \quad \vec{v}_2 = \begin{pmatrix} -2 \\ 3 \\ 4 \end{pmatrix}, \quad \vec{v}_3 = \begin{pmatrix} 4 \\ -1 \\ 6 \end{pmatrix}$$

are linearly dependent or independent. If they are dependent write $\vec{v}_1$ *as a combination of the others.*

Exercise 8. *Check if the vectors*

$$\vec{v}_1 = \begin{pmatrix} 1 \\ 3 \\ -2 \end{pmatrix}, \quad \vec{v}_2 = \begin{pmatrix} 2 \\ -4 \\ 5 \end{pmatrix}$$

are linearly dependent or independent. If they are dependent write $\vec{v}_1$ *as a combination of the other one.*

Exercise 9. *Check if the vectors*

$$\vec{v}_1 = \begin{pmatrix} 1 \\ -2 \end{pmatrix}, \quad \vec{v}_2 = \begin{pmatrix} 3 \\ 5 \end{pmatrix}, \quad \vec{v}_3 = \begin{pmatrix} -2 \\ 7 \end{pmatrix}$$

are linearly dependent or independent. If they are dependent write $\vec{v}_1$ *as a combination of the others.*

Exercise 10. *Check if the vectors*

$$\vec{v}_1 = \begin{pmatrix} 2 \\ 0 \\ 1 \\ 1 \end{pmatrix}, \quad \vec{v}_2 = \begin{pmatrix} 1 \\ 0 \\ 1 \\ -2 \end{pmatrix}, \quad \vec{v}_3 = \begin{pmatrix} 2 \\ 1 \\ 3 \\ 1 \end{pmatrix}, \quad \vec{v}_4 = \begin{pmatrix} 1 \\ 0 \\ 2 \\ 0 \end{pmatrix}$$

are linearly dependent or independent. If they are dependent write $\vec{v}_1$ *as a combination of the others.*