

ECON3120/4120 – Mathematics 2, fall term 06

Problems for seminar 6, 16/10-20/10.

1 Write the following systems of equations in matrix notation:

$$\begin{array}{lll}
 & x + y + z + t = a & ax + y + (a + 1)z = b_1 \\
 \text{(a)} \quad 2x_1 - 5x_2 = 3 & \text{(b)} \quad x + 3y + 2z + 4t = b & \text{(c)} \quad x + 2y + \quad z = b_2 \\
 5x_1 + 8x_2 = 5 & x + 4y + 8z = c & 3x + 4y + \quad 7z = b_3 \\
 & 2x + z - t = d &
 \end{array}$$

2 Using the matrices

$$\mathbf{A} = \begin{pmatrix} 2 & 0 \\ -1 & 1 \end{pmatrix}, \quad \mathbf{B} = \begin{pmatrix} -1 & 2 \\ 1 & -1 \end{pmatrix}, \quad \mathbf{C} = \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}, \quad \mathbf{D} = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 3 & 4 \end{pmatrix}$$

calculate (where possible),

(a) $2\mathbf{A} - 3\mathbf{B}$ (b) $(\mathbf{A} - \mathbf{B})'$ (c) $(\mathbf{C}'\mathbf{A}')\mathbf{B}'$ (d) $\mathbf{C}'(\mathbf{A}'\mathbf{B}')$ (e) $\mathbf{D}'\mathbf{D}'$ (f) $\mathbf{D}'\mathbf{D}$

3 The equation

$$ze^z - xy = 0$$

defines z as a function of x and y in a neighbourhood of the point $(x, y, z) = (1, e, 1)$. Find $z'_1(1, e)$, $z'_2(1, e)$, and $z''_{12}(1, e)$.

4 Exam problem 127.

5 Using Gauss-elimination find all solutions to

$$\begin{array}{rcl}
 x_1 + x_2 & - 2x_4 & = 2 \\
 & 2x_2 - x_3 - x_4 & = 3 \\
 x_1 + x_2 & + x_4 & = 2
 \end{array}$$