

Additional Tutorial - Problem Set 1

Problem 1

For the matrices

$$\mathbf{A} = \begin{pmatrix} 4 & 1 \\ 3 & 1 \end{pmatrix} \quad \mathbf{B} = \begin{pmatrix} -3 & 2 \\ 1 & -4 \end{pmatrix} \quad \mathbf{C} = \begin{pmatrix} -8 & 0 \\ 4 & 2 \end{pmatrix} \quad \mathbf{D} = \begin{pmatrix} 1 & -2 \\ 0 & 7 \end{pmatrix},$$

compute i) $2\mathbf{A} + 0.5\mathbf{C} - \mathbf{D}$ ii) $\mathbf{A}(\mathbf{BC})$ iii) $(\mathbf{AB})\mathbf{C}$ iv) $\mathbf{D}(\mathbf{BC})\mathbf{A}$.

Problem 2 (Based on Greene, Example 7, p.59)

Consider the following 3×3 matrix

$$\mathbf{B} = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$$

Compute \mathbf{B}^2 and \mathbf{B}^3 Repeat for 4×4 . Can you generalize your finding?

Problem 3

Compute the characteristic roots of

$$\mathbf{A} = \begin{pmatrix} 4 & 2 \\ 2 & 3 \end{pmatrix}.$$

Problem 4 (Based on Greene, Example 18, p.60)

Using the matrix \mathbf{A} in Problem 1, find the vector \mathbf{x} that minimizes $y = \mathbf{x}'\mathbf{A}\mathbf{x} + 2x_1 + 4x_2 - 10$. What is the value of y at the minimum? Now minimize y subject to the constraint $x_1 + x_2 = 1$.