

PROBLEMS 6. 16.11.2011

Q1. Show that

$$(AB)^{-1} = B^{-1}A^{-1}.$$

Q2. Show that

$$(AB)^T = B^T A^T.$$

Q3. Solve the equations

$$\begin{aligned} 2x + 4y - 3z &= -1, \\ x + y - 3z &= 2, \\ 3x + 5y + 5z &= 3 \end{aligned}$$

by Gaussian elimination. Check your answer.

Q4. Solve the equations in Q3 by Cramer's Rule, and compare the two solutions.

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Q1. Show that

$$A = \begin{pmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{pmatrix}$$

has

(i) a simple eigenvalue 8 with eigenvector

$$\begin{pmatrix} 2 \\ 1 \\ 2 \end{pmatrix},$$

(ii) a double eigenvalue -1 with eigenvectors

$$\begin{pmatrix} 1 \\ -2 \\ 0 \end{pmatrix}, \quad \begin{pmatrix} 0 \\ -2 \\ 1 \end{pmatrix}.$$

Q2. Find the Fourier series on $[0, 2\pi]$ of the function

$$f(x) := x \quad (0 \leq x < \pi), \quad 0 \quad (\pi \leq x \leq 2\pi).$$

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