

MATH 271 – Homework #5

due 26 February 2009

All calculations must be done in Maple!

1) Consider the system of equations

$$\begin{cases} 3x + 4y + 5z = 5 \\ 6x + 7y + 8z = 4 \\ 4x + 2y + 8z = 4 \end{cases}$$

Write this system of equations in the form

$$A\mathbf{x} = \mathbf{b}.$$

Then compute A^{-1} and use this to find \mathbf{x} .

2) Use matrices to find a fourth-degree polynomial that passes through the points $(-1, 1)$, $(0, 2)$, $(2, 4)$, $(3, 3)$, and $(5, 7)$. Then plot these points and this interpolating polynomial on the same set of axes.

3) Find the eigenvalues and eigenvectors of the matrix

$$\begin{bmatrix} 4 & -1 & 1 \\ -1 & 4 & -1 \\ 1 & -1 & 4 \end{bmatrix}.$$

Then select the largest eigenvalue λ and an associated eigenvector \mathbf{x} . Then calculate $A\mathbf{x}$ and $\lambda\mathbf{x}$ and show that they are equal.