

Computer Science/Mathematics 451.1
Assignment Three
Due 3 October 2007

1. Problem 1, p. 238
2. Problem 2, p.238
3. For the matrix

$$A = \begin{pmatrix} 7 & 8 & 8 \\ 6 & 5 & 4 \\ 1 & 2 & 3 \end{pmatrix}$$

and the Hilbert matrix of order 5 find

- (a) $\|A\|_1$ and \mathbf{x}_1 such that

$$\|A\mathbf{x}_1\|_1 = \|A\|_1$$

and $\|\mathbf{x}_1\|_1 = 1$.

- (b) $\|A^{-1}\|_1$ and \mathbf{y}_1 such that

$$\|A^{-1}\mathbf{y}_1\|_1 = \|A^{-1}\|_1$$

and $\|\mathbf{y}_1\|_1 = 1$.

- (c) $\|A\|_\infty$ and \mathbf{x}_∞ such that

$$\|A\mathbf{x}_\infty\|_\infty = \|A\|_\infty$$

and $\|\mathbf{x}_\infty\|_\infty = 1$.

- (d) $\|A^{-1}\|_\infty$ and \mathbf{y}_∞ such that

$$\|A^{-1}\mathbf{y}_\infty\|_\infty = \|A^{-1}\|_\infty$$

and $\|\mathbf{y}_\infty\|_\infty = 1$.

Feel free to use the MATLAB functions **hilb**, **invhilb**, **sum**, **max**, **inv**, and **abs**.

4. Compute the condition number of the matrix in Exercise 1, p. 238 in the one-norm.