

Homework problems

Use Maple to do the following computations. Write the answer below the problem. Also print out your Maple worksheet and attach.

- (1) Find the exact (no decimals) eigenvalues and corresponding eigenvectors of the matrix

$$\begin{bmatrix} 1 & 2 \\ 8 & -1 \end{bmatrix}$$

- (2) Find to two decimal places the eigenvalues and corresponding eigenvectors of the matrix

$$\begin{bmatrix} 2 & 3 & 1 \\ -2 & 3/2 & 7 \\ -1 & 2 & -6 \end{bmatrix}$$

- (3) Compute to 3 decimal places the value of

$$\int_0^1 \sqrt{1+2x^7} dx.$$

- (4) Compute to 3 decimal places the value of

$$\sum_{k=1}^{50} \frac{3^k}{k!}.$$

- (5) Let

$$z = e^{xy} \sin((x^2 + y^2)^{-1}).$$

Find

$$\frac{\partial z}{\partial y}$$

- (6) Let

$$A = \begin{bmatrix} 1 & 0 & -1/2 \\ 2 & 1 & 0 \\ 1 & & \end{bmatrix}$$

and

$$B = \begin{bmatrix} -1 & 3 & 0 \\ 1 & 3/4 & -2 \\ 0 & 1 & 1 \end{bmatrix}$$

Find

$$ABA^t.$$

(7) Let

$$C = \begin{bmatrix} i & 1-i & 1/2+i \\ 1 & 0 & 2+3i \\ 0 & -1 & -i \end{bmatrix}.$$

Find the exact value of C^{-1} .

- (8) Find (approximately to 3 decimal places) the rotation of the vector $(2, x, .78)^t$ an angle of 15 degrees about the y axis.

Read the proof in the notes that the eigenvalues of self-adjoint matrices are real. Use the same type of method to prove:

if A is self adjoint and if v and w are eigenvectors corresponding to two distinct eigenvalues of A then v and w are orthogonal ($v^*w = 0$).