

MATH 333 – Section 002 – Quiz 10

You may work with other class members on this quiz, but you may *not* receive assistance from people not in MATH 333 (Section 002). You must show all of your work to receive full credit. Do all your work on other sheets of paper and be sure to staple all the pieces of paper together or YOU WILL GET A 'ZERO' ON THE QUIZ. Do not use decimal approximations unless asked to do so. Your work on this quiz must be handed in by Friday, 17 November 2006 at 1040. GOOD LUCK!

1) Let λ be an eigenvalue of the matrix A with associated eigenvector \mathbf{x} . Let B be the matrix such that $B = A - \mu I$, where μ is a scalar and I is the identity matrix of the appropriate size. Prove that $\lambda - \mu$ is an eigenvalue of B with associated eigenvector \mathbf{x} .

2) Find all eigenvalues and associated eigenvectors of the matrix

$$A = \begin{bmatrix} 4 & -3 \\ 2 & -3 \end{bmatrix}.$$

3) Find all eigenvalues and associated eigenvectors of the matrix

$$A = \begin{bmatrix} -12 & 13 & -12 \\ 0 & -4 & 0 \\ 8 & -13 & 8 \end{bmatrix}.$$

4) Find all eigenvalues and associated eigenvectors of the matrix

$$A = \begin{bmatrix} 2 & 0 & -3 \\ 0 & 2 & 0 \\ 3 & 0 & -4 \end{bmatrix}.$$

5) Find the general solution of

$$\mathbf{x}' = A\mathbf{x},$$

where A is the matrix in exercise 2) above.

6) Solve the initial value problem

$$\begin{cases} \mathbf{x}' = A\mathbf{x} \\ \mathbf{x}(0) = \mathbf{x}_0 \end{cases}$$

where A is the matrix in exercise 3) above and where

$$\mathbf{x}_0 = \begin{bmatrix} 1 \\ -2 \\ -1 \end{bmatrix}.$$

7) Find the general solution of

$$\mathbf{x}' = A\mathbf{x},$$

where A is the matrix in exercise 4) above.