

Math 10B, Quiz 12

1. (9 points) Each part below is worth 3 points. Even if you get the first two parts wrong, you can receive credit for part (c) as long as your answer is consistent with your answers to parts (a) and (b).

$$A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$$

(a) Find the eigenvalues of A .

(b) Find all of the eigenvectors of A .

(c) Find all solutions to the following system of differential equations.

$$\begin{aligned}x' &= x + 4y \\y' &= 3x + 2y\end{aligned}$$

2. (2 points) v is an eigenvector of B .

$$B = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 & 5 \\ 0 & 0 & 2 & 3 & 0 \\ 6 & -3 & -3 & 0 & 5 \\ 2 & 2 & 2 & -2 & 1 \end{bmatrix} \quad v = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$$

True False

3. (2 points) It makes sense to ask for the eigenvalues of the following matrix

$$\begin{bmatrix} 2 & 4 & 6 & 1 \\ -2 & -2 & -1 & 0 \\ 3 & 12 & 16 & 0 \end{bmatrix}$$

True False

4. (2 points) A student is asked to find the eigenvalues and eigenvectors of some matrix C . The student believes that one of the eigenvalues is 3 and finds that $C - 3I$ is

$$\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$$

The student then claims that the corresponding eigenvector is

$$\begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

because the only solution to $(C - 3I)v = 0$ is $x_1 = 0$ and $x_2 = 0$. The student

- Found the wrong eigenvalue.
- May have found the correct eigenvalue but did not find a valid eigenvector.
- Is completely correct.