

Quiz 8, MATH 240, Fall 2023

Write your name clearly.

Name:

UID:

(1) Let $A = \begin{pmatrix} 2 & -3 & 2 \\ 0 & 5 & -2 \\ 0 & 3 & 0 \end{pmatrix}$.

- (a) (6 points) Show that $\mathbf{v} = \begin{pmatrix} 0 \\ 2 \\ 3 \end{pmatrix}$ is an eigenvector of A . What is the corresponding eigenvalue?
- (b) (6 points) Say you know that $\lambda = 3$ is an eigenvalue. Write down the augmented matrix we'd need to solve to find an eigenvector for λ , but DON'T SOLVE.
- (c) (8 points) Show that $\lambda = 1$ is **not** an eigenvalue of A .

(a) Note that $A\vec{v} = \begin{pmatrix} 2 & -3 & 2 \\ 0 & 5 & -2 \\ 0 & 3 & 0 \end{pmatrix} \begin{pmatrix} 0 \\ 2 \\ 3 \end{pmatrix}$

$$= \begin{pmatrix} 0 \\ 4 \\ 6 \end{pmatrix}$$
$$= 2\vec{v},$$

and so $\vec{v}$ is an eigenvector of A with eigenvalue 2

(b) We need to solve

$$[A - 3I \mid 0] = \left[\begin{array}{ccc|c} -1 & -3 & 2 & 0 \\ 0 & 2 & -2 & 0 \\ 0 & 3 & -3 & 0 \end{array} \right]$$

(c) Note that

$$\det(A - I) = \begin{vmatrix} 1 & -3 & 2 \\ 0 & 4 & -2 \\ 0 & 2 & 0 \end{vmatrix}$$
$$= \begin{vmatrix} 4 & -2 \\ 2 & 0 \end{vmatrix} \neq 0$$

so 1 is not an eigenvalue of A .