

Calculus and Linear Algebra II

Quiz 6

Instructions:

- Do all the work on this quiz paper.
- Show your work, i.e., write down the steps of your solution cleanly and readable.
- Electronic devices and notes are not allowed.

Name: _____

Problem 1 [8 points]

Compute the determinants of the following matrices. Look at these matrices carefully and try to infer what the determinant is with as little computation as possible. Also state for each matrix whether it is invertible or not.

(a)

$$\begin{pmatrix} 0 & 0 & 1 \\ 3 & 1 & 2 \\ 1 & 3 & 2 \end{pmatrix},$$

(b)

$$\begin{pmatrix} 1 & 2 & 3 & 4 \\ 7 & 9 & 3 & 5 \\ 2 & 3 & 3 & 3 \\ 1 & 2 & 3 & 4 \end{pmatrix},$$

(c)

$$\begin{pmatrix} 1 & 2 & 3 & 4 \\ 0 & 2 & 566 & 500 \\ 0 & 0 & 1 & 343 \\ 0 & 0 & 0 & 4000 \end{pmatrix},$$

(d)

$$\begin{pmatrix} 250 & 876865 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 435352 & 2 \\ 1 & 0 \end{pmatrix}$$

(Here it is asked for the determinant of the product of these two matrices, and whether or not this product has an inverse).

Problem 1 (extra space)

Problem 2 [7 points]

Compute all eigenvalues and the associated eigenvectors/eigenspace of the matrix

$$A = \begin{pmatrix} 2 & 1 & -1 \\ 0 & 2 & 1 \\ 0 & 0 & 1 \end{pmatrix},$$

and determine what the algebraic and geometric multiplicity of each eigenvalue is.

Problem 2 (extra space)