

Name:

OUID:

Instructions: Be sure to show as much work as possible, and please make a sincere effort to express your answers clearly and neatly. Please write your answers on your own paper, then staple your pages together using this sheet as a cover sheet.

1. Find the determinants of the following matrices:

$$\begin{bmatrix} 2 & 3 \\ 4 & 1 \end{bmatrix} \quad \begin{bmatrix} 1 & 2 & -1 \\ 1 & 1 & 1 \\ 0 & 2 & 1 \end{bmatrix} \quad \begin{bmatrix} 1 & 2 & 4 & 3 \\ 0 & 3 & 2 & 5 \\ 0 & 0 & 4 & 1 \\ 0 & 0 & 0 & 2 \end{bmatrix} \quad \begin{bmatrix} 3 & 5 & 2 & 9 & 0 \\ 5 & 3 & 9 & 5 & 1 \\ 0 & 1 & 4 & 2 & 9 \\ 1 & 8 & 5 & 2 & 0 \\ 5 & 3 & 9 & 5 & 1 \end{bmatrix}$$

2. The map $L: P_2 \rightarrow P_2$ given by $L(p(t)) = 2p'(t) + t^2p(0)$ has only one eigenvalue $\lambda = 2$. Find the dimension of the corresponding eigenspace. Do this directly, without using matrices.

3. (a) Find eigenvalues and eigenvectors of the following matrix:

$$A = \begin{bmatrix} 3 & 0 & 0 \\ -2 & 3 & -2 \\ 2 & 0 & 5 \end{bmatrix}$$

- (b) Find a diagonal matrix D and an invertible matrix P so that $A = P^{-1}DP$.