

NAME: _____
ID#: _____

PRACTICE MIDTERM EXAM

INSTRUCTIONS: *You have exactly 75 minutes to complete the exam. You must show all your work and be clear in your reasoning in order to receive full credit. No calculators, phones or tablets are allowed. You must obey the principles of academic integrity. You must include this sheet with your exam in order to receive a grade.*

1. Let

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

Compute A^n , for any integer $n \geq 1$.

2. Prove that the determinant of a diagonal matrix of size $n \times n$ is equal to the product of its diagonal elements.

3. Calculate

$$\det \begin{pmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{pmatrix}$$

4.

- (a) A matrix is said to be nilpotent if there exists an integer $p \geq 1$ so that $A^p = 0$. Prove that a nilpotent matrix is singular.
- (b) If A is an anti-symmetric matrix of type $n \times n$, i.e., $A^t = -A$, what is $\det(A)$ for n odd?