ALL
1
2
3
4
5
6
7
8
9
10

1. Section 1: Linear Algebra

Assume that B is a 3x3 matrix with the property that B2 = B. Which of the following statements about the matrix B MUST be true:

Pick **ONE** option

- B is invertible
- det(B) = 0
- $\det(B^5) = \det(B)$
- None of the above must be true

Clear Selection

2. Section 1: Linear Algebra

A be the set of rational values of a for which the matrix

$$\begin{pmatrix} a & -a & -1 & 0 \\ a & -a & 0 & -1 \\ 1 & 0 & a & -a \\ 0 & 1 & a & -a \end{pmatrix}$$

Is the square of matrix with rational entries. Number of elements in A are:

Pick **ONE** option

- 0
- 1
- 2
- 3

Clear Selection

3. Section 1: Linear Algebra

For an odd number p, let Sp denote the set of 2 X 2 matrices as follows:

$$S_p = \left\{ A = \begin{bmatrix} x & y \\ z & x \end{bmatrix} : x, y, z \in \{0, 1, 2, \ldots p-1\} \right\}$$

Find the number of A in Sp such that the trace of A is not divisible by p but det(A) is divisible by p.

Pick **ONE** option

- $(p-1)(p^2-p+1)$
- $p^3-(p-1)^2$
- $(p-1)^2$
- $(p-1)(p^2-2)$

Clear Selection

4. Section 1: Linear Algebra

Which of the following is true?

Pick **ONE** option

- 2 × 2 matrix A is diagonalizable if $A + A^T$ is diagonalizable.
- If A is a reflection at the line 3x = 4y and B is a projection onto x = y line then A + B is diagonalizable
- The sum of two eigenvectors v1, v2 of a matrix A is an eigenvector of A
- If S is the matrix which contains an eigen basis of a n × n matrix A as columns, then AS = DS, where D is a diagonal matrix.

Clear Selection

Continue