MATH 117: Daily Assignment 10

WRITE YOUR NAME HERE

August 24, 2023

See the daily assignment webpage for due dates, templates, and assignment description. Try to explain your reasoning and justify your computations for every problem. You should not appeal to any theorems that we have not proved yet.

1. Let $F = \mathbb{Z}_5$. Determine which of the following matrices are diagonalizable. If the matrix is diagonalizable, find an invertible matrix P such that $P^{-1}AP$ is diagonal.

(a) $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$

(b) $\begin{pmatrix} 2 & 4 \\ 3 & 3 \end{pmatrix}$.

(c) $\begin{pmatrix} 1 & 1 & 0 & 4 \\ 2 & 4 & 1 & 1 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

(d) $\begin{pmatrix} 1 & 1 & 0 \\ 0 & 4 & 1 \\ 0 & 0 & 1 \end{pmatrix}$

2. Let F be a field. Let $W = \{A \in F^{2\times 2} : c_A(x) = x^2 + \alpha \text{ for some } \alpha \in F\}$. Is W a subspace of $F^{2\times 2}$?