Homework 2
MATH 132

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1. Find a matrix $C$ such that $C^{-1}AC = D$ for some diagonal matrix $D$ if $A = \begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 3 \\ 1 & 1 & -1 \end{pmatrix}$.

2. Let $A = \begin{pmatrix} 5 & 6 \\ -2 & -2 \end{pmatrix}$. Find $A^6$.

3. Let $A$ be a diagonalizable matrix whose eigenvalues are all either 1 or -1. Show that $A^{-1} = A$.

4. Let $A$ be an $n \times n$ matrix with eigenvalue $\lambda$ of multiplicity $n$. Show $A$ is diagonalizable if and only if $A = \lambda I$.

5. Let $A = ST$ where $S$ is invertible. Let $B = TS$. Show that $B$ is similar to $A$.

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6. Let $T : \mathbb{R}^2 \to \mathbb{R}^2$ be the linear transformation that reflects about the line $y + 4x = 0$. Find a formula for the transformation $T$.

7. Let $A$ be a diagonalizable matrix and suppose $B$ is similar to $A$. Show that $B$ is also diagonalizable.

8. Let $A$ and $B$ be $n \times n$ matrices with the same diagonalizing matrix $C$. Show that $AB = BA$. 