# 110.201 Linear Algebra
# 6th Quiz

May 6, 2005

**Problem 1** Let

$$A = \begin{bmatrix} 2 & 0 \\ 1 & 3 \end{bmatrix}.$$

1. Find an invertible matrix $S$ and a diagonal matrix $D$ such that $S^{-1}AS = D$.

2. Find a formula for the entries of $A^n$, where $n$ is a positive integer.

**Problem 2** Let

$$A = \begin{bmatrix} 1 & 2i \\ -i & 0 \end{bmatrix}, \qquad i^2 = -1.$$

1. Find the eigenvalues of A.

2 Find $A^{50}$.

**Problem 3** Let A to be a $3 \times 3$ matrix with eigenvalues 2, $-2$, 1.
Let $B = A^3 - 3A^2$.

1. Find the eigenvalues of B. Is B diagonalizable? If yes, find a diagonal matrix D such that $D = S^{-1}BS$, for some orthogonal matrix $S$.

2. Find $\det(B)$ and $\det(A - 3I_3)$.