# QUIZ #19, 10/30/07

MATH 54, FALL 2007

*Show your work and justify your answers! Feel free to use both sides.*

**Name:**

1. (7 pts) (a) Find all real eigenvalues of $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 2 \\ 0 & 0 & 2 \end{bmatrix}$ with their algebraic multiplicities.

(b) Find all eigenvectors of $A$. What are the geometric multiplicities of each eigenvalue of $A$?

(c) Does $A$ have an eigenbasis? If yes, find an eigenbasis for $A$.

2. (3 pts) Suppose $A$ is an $n \times n$ matrix that has an eigenbasis and all of its eigenvalues have absolute value less than one. Consider some vector $\vec{v}$ (not necessarily an eigenvector). What is $\lim_{t \to \infty} A^t \vec{v}$? (Hint: Write $\vec{v}$ as a linear combination of eigenvectors.)