

**Math 60**  
**Homework 9**

Name \_\_\_\_\_  
Due Wednesday November 16 before 4:00 PM

1. Let  $f : \mathbb{R}^3 \rightarrow \mathbb{R}^3$  be given by  $f(x, y, z) = (x + y - z, 2x + y, x - y + 3z)$ . Find a polynomial  $p$  such that  $p(f)(1, 1, 1) = (0, 0, 0)$ .

2. Find the eigenvalues and eigenspaces of the matrix  $A = \begin{bmatrix} 1 & -1 & -1 \\ 0 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ .

3. Diagonalize the matrix

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

4. Prove that eigenvectors corresponding to different eigenvalues are linearly independent.