MA 665 EXERCISES 5

(1) Prove that two 3×3 matrices are similar if and only if they have the same minimal and characteristic polynomials. Provide an explicit counterexample to this statement for 4×4 matrices.

(2) Prove that an $n \times n$ matrix A with entries in $\mathbb{C}$ satisfying $A^3 = A$ can be diagonalized. Is the same statement true over *any* field K?

(3) Determine the Jordan canonical form of the $n \times n$ matrix over $\mathbb{C}$ whose entries are all equal to 1.