

NAME:

Problem 1. Find the Jordan form J for the matrix  $A = \begin{bmatrix} 1 & 2 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 2 & 1 & 0 \\ 1 & 2 & 1 & 1 \end{bmatrix}$

Problem 2. Find a matrix P such that for A and J from problem 1  $A = P^{-1}JP$ .

Problem 3. Solve, in complex numbers, the equation  $(z - i)^3 = \bar{z} + i$

Problem 4. Show that, for every linear mapping  $F: V \rightarrow W$ ,  $\text{rank}(F) \leq \dim V$ .

Problem 5. Find a matrix B such that  $AB = C$ , where

$$A = \begin{bmatrix} 0 & 5 & 2 & 5 \\ 4 & 7 & 3 & 6 \\ -2 & 5 & -2 & 4 \\ 6 & 7 & 7 & 7 \end{bmatrix} \quad C = \begin{bmatrix} 2 & 1 & 3 & 2 \\ 1 & 4 & 1 & 5 \\ 2 & -1 & 3 & 1 \\ 1 & 6 & 1 & 6 \end{bmatrix}$$