

1. True or False?

Suppose $T \in \mathcal{L}(\mathbf{C}^5)$ is such that $\text{null } T^2 \neq \text{null } T^3$. Then T has at most 3 distinct eigenvalues.

2. True or False?

Suppose $T \in \mathcal{L}(\mathbf{C}^3)$ and 2 is the only eigenvalue of T . Then $T^3 = 8I$.

3. True or False?

Suppose 6 and 7 are the two distinct eigenvalues of $T \in \mathcal{L}(\mathbf{C}^4)$, and

$$\text{range}(T - 7I)^2 = \text{range}(T - 7I)^3.$$

Then the eigenvalue 6 has multiplicity 2.