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AI25BTECH11001 - ABHISEK MOHAPATRA

Question: Let $\mathbf{A} = 10\mathbf{I}_3$, where \mathbf{I}_3 is the identity matrix. Find the nullity of $5\mathbf{A}(\mathbf{I}_3 + \mathbf{A} + \mathbf{A}^2)$.

Solution: Given,

$$\mathbf{A} = 10\mathbf{I}_3, \mathbf{A}^2 = 10^2\mathbf{I}_3, \mathbf{A}^3 = 10^3\mathbf{I}_3 \quad (1)$$

So,

$$5\mathbf{A}(\mathbf{I}_3 + \mathbf{A} + \mathbf{A}^2) \quad (2)$$

$$5(\mathbf{A} + \mathbf{A}^2 + \mathbf{A}^3) \quad (3)$$

$$5(10 + 100 + 1000)\mathbf{I} \quad (4)$$

So, rank is 3 and nullity is 0.