12.34

AI25BTECH11001 - ABHISEK MOHAPATRA

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Question: Let $\mathbf{A} = 10\mathbf{I_3}$, where $\mathbf{I_3}$ is the identity matrix. Find the nullity of $5\mathbf{A}\left(\mathbf{I_3} + \mathbf{A} + \mathbf{A}^2\right)$.
Solution: Given,

$$\mathbf{A} = 10\mathbf{I_3}, \mathbf{A}^2 = 10^2\mathbf{I_3}, \mathbf{A}^3 = 10^3\mathbf{I_3} \tag{0.1}$$

So,

$$5\mathbf{A}\left(\mathbf{I_3} + \mathbf{A} + \mathbf{A}^2\right) \tag{0.2}$$

$$5\left(\mathbf{A} + \mathbf{A}^2 + \mathbf{A}^3\right) \tag{0.3}$$

$$5\left(10 + 100 + 1000\right)\mathbf{I} \tag{0.4}$$

So, rank is 3 and nullity is 0.