

Give an example of an operator  $T$  on a complex vector space s.t.  $T^9 = T^8$  but  $T^2 \neq T$ .

As opposed to a normal operator.

Let  $T \in \mathcal{L}(\mathbb{C}^3)$  defined by

$$T(x, y, z) = (y, z, 0)$$

Then

$$T^2(x, y, z) = T(y, z, 0) = T(z, 0, 0) \neq (y, z, 0) = T$$

and yet

$$T^8(x, y, z) = (0, 0, 0) = T^9(x, y, z)$$