

PRACTICE 3k

(1) Show that the following functions are linear mappings, and find their standard matrix $[L]$.

(a) $L : \mathbb{C}^2 \rightarrow \mathbb{C}^2$ defined by $L(z_1, z_2) = (0, z_1, z_2)$

(b) $L : \mathbb{C}^4 \rightarrow \mathbb{C}^3$ defined by $L(z_1, z_2, z_3, z_4) = (z_1, z_2, z_3)$

(c) $L : \mathbb{C}^2 \rightarrow \mathbb{C}^2$ defined by $L(z_1, z_2) = ((1+i)z_1, (1-i)z_1 + (1+i)z_2)$

(2) Give a counterexample to show that the following functions are not linear.

(a) $M : \mathbb{C}^1 \rightarrow \mathbb{C}^1$ defined by $M(z) = \operatorname{Re}(z)$

(b) $M : \mathbb{C}^2 \rightarrow \mathbb{C}^2$ defined by $M(z_1, z_2) = (z_1^2, z_2^2)$