

$$T(x) = (2x_1 - x_2 + x_4, x_2 - 2x_3 + x_4, x_1 + x_2 - 2x_3)$$

• B basis of \mathbb{R}^4 : $B = \{(1, 0, 0, 0), (0, 1, -1, 0), (0, 0, 0, 1), (0, 1, 1, 1)\}$

• C basis of \mathbb{R}^3 : $C = \{(1, 1, 1), (1, 1, 0), (1, 0, 0)\}$

$$A = \begin{bmatrix} 2 & -1 & 0 & 1 \\ 0 & 1 & -2 & 1 \\ 1 & 1 & -2 & 0 \end{bmatrix} \equiv \text{matrix associated with } T$$

TASK: COMPUTE THE MATRIX $M_B^C(T)$

i. CALCULATE THE FOUR IMAGES

$$T(1, 0, 0, 0) = (2, 0, 1) ; T(0, 1, -1, 0) = (-1, 3, 3)$$

$$T(0, 0, 0, 1) = (1, 1, 0) ; T(0, 1, 1, 1) = (0, 0, -1)$$

ii. FIND THE COORDINATES OF $(2, 0, 1), (-1, 3, 3), (1, 1, 0), (0, 0, -1)$ WITH RESPECT TO BASIS C

Solving a linear system we get: $T_C(2, 0, 1) = (1, -1, 2)$

$$T_C(-1, 3, 3) = (3, 0, -4)$$

$$T_C(1, 1, 0) = (0, 1, 0)$$

$$T_C(0, 0, -1) = (-1, 1, 0)$$

iii. Put the results obtained in ii inside column vectors

$$M_B^C(T) = M = \begin{bmatrix} 1 & 3 & 0 & -1 \\ -1 & 0 & 1 & 1 \\ 2 & 4 & 0 & 0 \end{bmatrix}$$