Q Find matrix of T if $T : R^3 \longrightarrow R^2$ by
$T(x, y, z) = (2x - 4y + 9z, 5x + 3y - 2z)$
with respect to standard basis.

Solution

The standard basis for R^3 : $B = \{(1,0,0), (0,1,0), (0,0,1)\}$
The standard basis for R^2 : $B' = \{(1,0), (0,1)\}$

Now $T(1,0,0) = (2,5) = 2(1,0) + 5(0,1)$
$T(0,1,0) = (-4,3) = -4(1,0) + 3(0,1)$
$T(0,0,1) = (9,-2) = 9(1,0) + (-2)(0,1)$

$$[T ; B ; B'] = \begin{bmatrix} 2 & -4 & 9 \\ 5 & 3 & -2 \end{bmatrix}$$ Ans.

Q $[T ; B ; B']$ For $T : V^2 \longrightarrow V^3$
$T(x_1, x_2) = (x_1 + x_2, 2x_1 - x_2, 7x_2)$
with standard basis.