$$\begin{bmatrix} a_{11} & a_{21} & \cdots\cdots & a_{n1} \\ a_{12} & a_{22} & \cdots\cdots & a_{n2} \\ \vdots & \vdots & & \vdots \\ a_{1m} & a_{2m} & \cdots\cdots & a_{nm} \end{bmatrix} = [T : \overset{U}{B} \quad \overset{V}{B'}]$$

(Matrix of Linear Transformation)

$$T : V(F) \longrightarrow V(F)$$

$$[T : B] \quad , \quad [T]_B$$

Question 01 Find matrix of $T: V_3(R) \longrightarrow V_3(R)$ by $T(a,b,c) = (2b+c, a-4b, 3a)$ corresponding to the basis.

i) $B = \{(1,0,0), (0,1,0), (0,0,1)\}$

ii) $B' = \{(1,1,1), (1,1,0), (1,0,0)\}$

Also Verify that $[T; B'][\alpha : B'] = [T(\alpha) : B']$

Solution

Let.

$$e_1 = (1,0,0), \; e_2 = (0,1,0), \; e_3 = (0,0,1)$$

$$T(e_1) = T(1,0,0) = (0,1,3) = 0(1,0,0) + 1(0,1,0) + 3(0,0,1)$$

$$T(e_2) = T(0,1,0) = (2,-4,0) = 2(1,0,0) + (-4)(0,1,0) + 0(0,0,1)$$

$$T(e_3) = T(0,0,1) = (1,0,0) = 1(1,0,0) + 0(0,1,0) + 0(0,0,1)$$