(2)

$$\det(A) = \begin{vmatrix} 1 & 2 & 3 \\ 2 & 9 & 3 \\ 1 & 0 & 4 \end{vmatrix} = -1 \text{ (Trivial)}$$

So, the set $S = \{v_1, v_2, v_3\}$ is linearly independent in R^3.

So, S is a basis for R^3.

(b) Find the coordinates vector of $V = (5, -1, 9)$ with respect to S.

$$V = c_1 v_1 + c_2 v_2 + c_3 v_3$$

Now find scalar c_1, c_2 and c_3

$$(5, -1, 9) = c_1(1,2,1) + c_2(2,9,0) + c_3(3,3,4)$$

$$c_1 + 2c_2 + 3c_3 = 5$$

$$2c_1 + 9c_2 + 3c_3 = -1$$

$$c_1 + 0c_2 + 4c_3 = 9$$

$$\left[\begin{array}{ccc|c} 1 & 2 & 3 & 5 \\ 2 & 9 & 3 & -1 \\ 1 & 0 & 4 & 9 \end{array}\right]$$

$$R_2 - 2R_1 \;,\; R_3 - R_1$$

$$\left[\begin{array}{ccc|c} 1 & 2 & 3 & 5 \\ 0 & 5 & -3 & -11 \\ 0 & -2 & 1 & 4 \end{array}\right]$$