1992-AL-P-MATH-1-Q01

1(a)

Consider augmented matrix of the system:

$$\left[\begin{array}{ccc|c} 1 & t+3 & 5 & 3 \\ -3 & 9 & -15 & s \\ 2 & t & 10 & 6 \end{array}\right]$$

$$\Rightarrow \left[\begin{array}{ccc|c} 1 & t+3 & 5 & 3 \\ 0 & 3t+18 & 0 & s+9 \\ 0 & -t-6 & 0 & 0 \end{array}\right]$$

$\Rightarrow$ (when $y \neq 0$, -t-6=0) or (when y = 0, t can be any real number and s+9=0)

$\Rightarrow$ (when $y \neq 0$, t=-6 and s+9=0) or (when y = 0, t can be any real number and s=-9)

$\Rightarrow$ (when $y \neq 0$, t=-6 and s=-9) or (when y = 0, t can be any real number and s=-9)

$\Rightarrow$ s = -9 and t can be any real number

1(b)

When s=-9 and t=-6, we have x - 3y + 5z = 3

$\Rightarrow$ x = a which is any real number, y = b which is any real number and z = $\frac{3-a+3b}{5}$

When s=-9 and $t \neq -6$, we must have y=0 and x + 5z = 3

$\Rightarrow$ x = a which is any real number, y = 0 and z = $\frac{3-a}{5}$