3) The values of λ and μ for which the system of linear equations

[Main Sep. 06, 2020 (I)]

$$x+y+z=2$$
$$x+2y+3z=5$$
$$x+3y+\lambda z=\mu$$

has infinitely many solutions are, respectively:

(a) 6 and 8 (b) 5 and 7

(c) 5 and 8 (d) 4 and 9

Solution: (c)

$$D=\begin{vmatrix}1 & 1 & 1\\ 1 & 2 & 3\\ 1 & 3 & \lambda\end{vmatrix} = (2\lambda-9)-(\lambda-3)+(3-2) = \lambda-5.$$

We know, $D=0 \Rightarrow \lambda-5=0 \Rightarrow \lambda=\boxed{5}$

$$D_x=\begin{vmatrix}2 & 1 & 1\\ 5 & 2 & 3\\ \mu & 3 & 5\end{vmatrix}=0$$

$$\Rightarrow 2(10-9)-(25-3\mu)+(15-2\mu)=0$$

$$\Rightarrow 2-25+3\mu+15-2\mu=0$$

$$\Rightarrow \mu=10-2=\boxed{8}$$