1) The system of linear equations:

$3x-2y-kz=10$; $2x-4y-2z=6$; $x+2y-z=5m$

is inconsistent if: [Main Feb 24, 2021 (I)]

(a) $k=3, m=\frac{4}{5}$ (b) $k\neq 3, m\in R$

(c) $k\neq 3, m\neq\frac{4}{5}$ (d) $k=3, m\neq\frac{4}{5}$

Solution: (d)

$$\Delta=\begin{vmatrix}3&-2&-k\\2&-4&-2\\1&2&-1\end{vmatrix}=0$$

$$\Rightarrow 24-2(0)-k(8)=0\Rightarrow k=3$$

$$\Delta_x=\begin{vmatrix}10&-2&-3\\6&-4&-2\\5m&2&-1\end{vmatrix}$$

$$=10(8)-2(-10m+6)-3(12+20m)$$

$$=8(4-5m)$$

$$\Delta_y=\begin{vmatrix}3&10&-3\\2&6&-2\\1&5m&-1\end{vmatrix}$$

$$=3(-6+10m)+10(0)-3(10m-6)$$

$$=0$$

$$\Delta_z=\begin{vmatrix}3&-2&10\\2&-4&6\\1&2&5m\end{vmatrix}$$

$$=3(-20m-12)-2(6-10m)+10(8)$$

$$=40m-32=8(5m-4)$$

For inconsistent

$k=3$, & $m\neq\frac{4}{5}$