SYSTEMS OF LINEAR EQUATIONS (PART III)

Substitution. Dependent systems.

Example

$$\begin{cases} 2x+3y+4z=20 \\ 4x+6y+8z=40 \\ 3x+2y-5z=-8 \end{cases}$$

$2x+3y+4z=20 \Rightarrow x=\dfrac{20-3y-4z}{2}$

$4x+6y+8z=40 \Rightarrow x=\dfrac{40-6y-8z}{4}$

$3x+2y-5z=-8 \Rightarrow x=\dfrac{-8-2y+5z}{3}$

$$\frac{20-3y-4z}{2}=\frac{40-6y-8z}{4} \Rightarrow 80-12y-16z=80-12y-16z$$

$0=0$ TRUE

$$\frac{20-3y-4z}{2}=\frac{-8-2y+5z}{3} \Rightarrow 60-9y-12z=-16-4y+10z$$

$$\Rightarrow 76-22z=5y \Rightarrow \boxed{y=\frac{76-22z}{5}}$$

$$x=\frac{20-3y-4z}{2}=\frac{\frac{20}{1}-3\cdot\frac{76-22z}{5}-4z}{2}$$

$$=\frac{\frac{100-228+66z-20z}{5}}{2}=\frac{\frac{-128+46z}{5}}{2}$$

$$x=\frac{-128+46z}{10}=\boxed{\frac{-64+23z}{5}}$$

Solution $\left(\dfrac{-64+23z}{5}, \dfrac{76-22z}{5}, z\right)$