

Combination of 2 and 3 Variable system of eq
Ex) Solve the system of equations

$$\begin{cases} x + 2y + 2z = 1 & (1) \\ 3y + 4z = 1 & (2) \\ 4x - y = 3 & (3) \end{cases}$$

$$\begin{aligned} x + 2y + 2z &= 1 & (1) \\ 0 + 3y + 4z &= 1 & (2) \\ 4x - y + 0 &= 3 & (3) \end{aligned}$$

$$\begin{aligned} 4[x + 2y + 2z = 1] & \quad (1) \\ 4x - y + 0 &= 3 & (2) \end{aligned}$$

$$\begin{aligned} 4x + 8y + 8z &= 4 & (1) \\ - (4x - y + 0 &= 3) & (2) \\ \hline 9y + 8z &= 1 & (4) \end{aligned}$$

$$\begin{aligned} 3[3y + 4z = 1] & \quad (2) \\ 9y + 8z &= 1 & (4) \end{aligned}$$

$$\begin{aligned} 9y + 12z &= 3 & (2) \\ - (9y + 8z &= 1) & (4) \\ \hline 4z &= 2 \end{aligned}$$

$$z = \frac{1}{2}$$

$$\boxed{\left(\frac{2}{3}, -\frac{1}{3}, \frac{1}{2}\right)}$$

$$\begin{aligned} 3y + 4\left(\frac{1}{2}\right) &= 1 & (2) \\ 3y + 2 &= 1 \\ 3y &= -1 \\ y &= -\frac{1}{3} \end{aligned}$$

$$\begin{aligned} x + 2\left(-\frac{1}{3}\right) + 2\left(\frac{1}{2}\right) &= 1 \\ x - \frac{2}{3} + 1 &= 1 \\ x &= \frac{2}{3} \end{aligned}$$

Solve the system of equations

$$\begin{cases} \frac{1}{x} + \frac{1}{y} - \frac{1}{z} = -1 & (1) \\ \frac{1}{y} + \frac{1}{z} = -1 & (2) \\ \frac{1}{x} + \frac{1}{y} = 1 & (3) \end{cases}$$

$$\begin{cases} \frac{1}{x} + \frac{1}{y} - \frac{1}{z} = -1 & (1) \\ 0 + \frac{1}{y} + \frac{1}{z} = -1 & (2) \\ \frac{1}{x} + \frac{1}{y} + 0 = 1 & (3) \end{cases}$$

$$\begin{array}{rcl} \frac{1}{x} + \frac{1}{y} - \frac{1}{z} & = & -1 & (1) \\ + \quad 0 + \frac{1}{y} + \frac{1}{z} & = & -1 & (2) \\ \hline \frac{1}{x} + \frac{2}{y} & = & -2 & (4) \end{array}$$

$$\begin{array}{rcl} \frac{1}{x} + \frac{1}{y} & = & 1 & (3) \\ - \quad \frac{1}{x} + \frac{2}{y} & = & -2 & (4) \\ \hline -\frac{1}{y} & = & 3 \end{array}$$

$$-\frac{1}{y} = 3$$

$$-\frac{1}{3} = y$$

→

$$\frac{(-3)!}{(-3)(-1/3)} + \frac{1}{z} = -1 \quad (2)$$

$$-3 + \frac{1}{z} = -1$$

$$\frac{1}{z} = 2$$

$$z = \frac{1}{2}$$

~~1/4, -1/3, 1/2~~

$$\frac{1}{x} + \frac{1}{(-1/3)} + \frac{1}{(1/2)} = -1$$

$$\frac{1}{x} - 3 - 2 = -1$$

$$\frac{1}{x} - 5 = -1$$

$$\frac{1}{x} = 4$$

$$1/4 = x$$

$$\boxed{(1/4, -1/3, 1/2)}$$