

Hv 1:

1.2.2:

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

$$E_1 + E_2 \rightarrow E_2$$

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

$$E_2 + E_1 \rightarrow E_2$$

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

$$E_2 + 2E_3 \rightarrow E_2$$

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

$$E_3 + E_2 \rightarrow E_3$$

$$x + y - z = 0$$

$$y = 2$$

$$z = 3$$

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

$$x = 1, y = 2, z = 3$$

1.2.3

$$4y - 3z = 3$$

$$-x + 7y - 5z = 4$$

$$-x + 8y - 6z = 5$$

$$E_2 \leftrightarrow E_1$$

$$-x + 7y - 5z = 4$$

$$4y - 3z = 3$$

$$-x + 8y - 6z = 5$$

$$E_1 \cdot -1 \rightarrow E_1$$

$$x - 7y + 5z = -4$$

$$4y - 3z = 3$$

$$-x + 8y - 6z = 5$$

$$2E_2 \rightarrow E_2$$

~~$$E_2 \leftrightarrow E_1$$~~

~~$$\begin{array}{l} x - 7y + 5z = -4 \\ 4y - 3z = 3 \\ -x + 8y - 6z = 5 \end{array}$$~~

$$x - 7y + 5z = -4$$

$$8y - 6z = 6$$

$$-x + 8y - 6z = 5$$

~~$$E_2 \leftrightarrow E_1$$~~ 
$$E_2 - E_3 \rightarrow E_2$$

$$x - 7y + 5z = -4$$

$$-12z = 1$$

$$-x + 8y - 6z = 5$$

$$E_3 + E_1 \rightarrow E_3$$

$$x - 7y + 5z = -4$$

$$-12z = 1$$

$$y - z = 1$$

$$E_2 \cdot \frac{1}{12} \rightarrow E_2$$

$$E_2 \leftrightarrow E_3$$

$$x - 7y + 5z = -4$$

$$y - z = 1$$

$$z = -\frac{1}{12}$$

$$z = -\frac{1}{12}, y = \frac{11}{12}, x = 2.$$

1.2.8:

$$-x + 3y - 2z = 1$$

$$-x + 4y - 3z = 0$$

$$-x + 5y - 4z = 0$$

$$E_1 \rightarrow -1 \rightarrow E_1$$

$$x + 3y + 2z = -1$$

$$-x + 4y - 3z = 0$$

$$-x + 5y - 4z = 0$$

$$E_2 + E_1 \rightarrow E_2$$

$$x - 3y + 2z = -1$$

$$y - z = -1$$

$$-x + 5y - 4z = 0$$

$$E_3 + E_1 \rightarrow E_3$$

$$x - 3y + 2z = -1$$

$$y - z = -1$$

$$2y - 2z = -1$$

$$E_3 - 2E_2 \rightarrow E_3$$

$$x - 3y + 2z = -1$$

$$y - z = -1$$

$$0 = 1$$

?

No solution because

The original assumption that there is a solution was proven wrong since the following implications led to an invalid equation.

1.2.9

$$-x + 3y - 2z = 4$$

$$-x + 4y - 3z = 5$$

$$-x + 5y - 4z = 6$$

$$E_1 \cdot -1 \Rightarrow E_1$$

$$x + 3y + 2z = -4$$

$$-x + 4y - 3z = 5$$

$$-x + 5y - 4z = 6$$

$$E_2 + E_1 \rightarrow E_2$$

$$x - 3y + 2z = -4$$

$$y - z = 1$$

$$-x + 5y - 4z = 6$$

$$E_3 + E_1 \rightarrow E_3$$

$$x - 3y + 2z = -4$$

$$y - z = 1$$

$$2y - 2z = -2$$

$$E_3 - 2E_2 \rightarrow E_3$$

$$x - 3y + 2z = -4$$

$$y - z = 1$$

$$0 = 0$$

Since The system  
simplifies to 2 equations  
with 3 unknown variables,  
there are infinite solutions