Step-1

Given system is $2u - v \qquad\qquad = 0$

$$\begin{aligned} -u + 2v - w \qquad &= 0 \\ -v + 2w - z &= 0 \\ -w + 2z &= 5 \end{aligned}$$

We have to find the pivots and solve this system.

Step-2

Given system can be written as

$$\begin{bmatrix} 2 & -1 & 0 & 0 & 0 \\ -1 & 2 & -1 & 0 & 0 \\ 0 & -1 & 2 & -1 & 0 \\ 0 & 0 & -1 & 2 & 5 \end{bmatrix}$$

apply $R_2 \to 2R_2 + R_1$

$$□ \begin{bmatrix} 2 & -1 & 0 & 0 & 0 \\ 0 & 3 & -2 & 0 & 0 \\ 0 & -1 & 2 & -1 & 0 \\ 0 & 0 & -1 & 2 & 5 \end{bmatrix}$$

apply $R_3 \to 3R_3 + R_2$

$$□ \begin{bmatrix} 2 & -1 & 0 & 0 & 0 \\ 0 & 3 & -2 & 0 & 0 \\ 0 & 0 & 4 & -3 & 0 \\ 0 & 0 & -1 & 2 & 5 \end{bmatrix}$$

Step-3

apply $R_4 \to 4R_4 + R_3$

$$□ \begin{bmatrix} 2 & -1 & 0 & 0 & 0 \\ 0 & 3 & -2 & 0 & 0 \\ 0 & 0 & 4 & -3 & 0 \\ 0 & 0 & 0 & 5 & 20 \end{bmatrix}$$

which is upper triangular form.

The pivots are circled in $\begin{bmatrix} \boxed{2} & -1 & 0 & 0 & 0 \\ 0 & \boxed{3} & -2 & 0 & 0 \\ 0 & 0 & \boxed{4} & -3 & 0 \\ 0 & 0 & 0 & \boxed{5} & 20 \end{bmatrix}$.

That is $\boxed{2,3,4,5}$.

Step-4

From above upper triangular form, we have

$$\begin{aligned} 2u - v \quad\quad\quad\quad &= 0 \\ 3v - 2w \quad\quad &= 0 \\ 4w - 3z &= 0 \\ 5z &= 20 \end{aligned}$$

By back ward substitution,

$5z = 20$

$\Rightarrow \boxed{z = 4}$

$4w - 3z = 0$

$\Rightarrow 4w - 3(4) = 0$

$\Rightarrow \boxed{w = 3}$

$3v - 2w = 0$

$\Rightarrow 3v - 2(3) = 0$

$\Rightarrow \boxed{v = 2}$

$2u - v = 0$

$\Rightarrow 2u - 2 = 0$

$\Rightarrow \boxed{u = 1}$

Solutions are $\boxed{u = 1, v = 2, w = 3, z = 4}$