

SPP Example

$$\begin{bmatrix} 2 & 4 & -2 \\ 1 & 3 & 4 \\ 5 & 2 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 6 \\ -1 \\ 2 \end{bmatrix}$$

$$l = [1 \quad 2 \quad 3]$$

$$s = [4 \quad 4 \quad 5]$$

SPP Example

- $k = 1$

$$\left\{ \frac{|a_{l_i,1}|}{s_{l_i}} : i = 1,2,3 \right\} = \left\{ \frac{2}{4}, \frac{1}{4}, \frac{5}{5} \right\}$$

- $j = 3$ is the max ratio index
- Swap l_j with l_k
- $l = [3 \quad 2 \quad 1]$
- Row $l_k = 3$ is the pivot row

SPP Example

- Perform elimination

$$\begin{bmatrix} 0 & 16/5 & -2 \\ 0 & 13/5 & 4 \\ 5 & 2 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 26/5 \\ -7/5 \\ 2 \end{bmatrix}$$

$$l = [3 \quad 2 \quad 1]$$

$$s = [4 \quad 4 \quad 5]$$

SPP Example

- $k = 2$

$$\left\{ \frac{|a_{l_i,2}|}{s_{l_i}} : i = 2,3 \right\} = \left\{ \frac{13}{20}, \frac{16}{20} \right\}$$

- $j = 3$ is the max ratio index
- Swap l_j with l_k
- $l = [3 \quad 1 \quad 2]$
- Row $l_k = 1$ is the pivot row

SPP Example

- Perform elimination

$$\begin{bmatrix} 0 & 16/5 & -2 \\ 0 & 0 & 45/8 \\ 5 & 2 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 26/5 \\ -45/8 \\ 2 \end{bmatrix}$$

$$l = [3 \quad 1 \quad 2]$$

$$s = [4 \quad 4 \quad 5]$$

SPP Example

- Back solve:

$$\begin{bmatrix} 0 & 16/5 & -2 \\ 0 & 0 & 45/8 \\ 5 & 2 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 26/5 \\ -45/8 \\ 2 \end{bmatrix}$$

$$l = [3 \quad 1 \quad 2]$$

$$x = [0 \quad 1 \quad -1]$$