

## Homework 5, problem 2.

The augmented matrix is  $\left[ \begin{array}{ccc|c} 1 & 1 & -1 & 0 \\ 0 & 12 & -1 & 4 \\ 2 & 1 & 1 & 5 \end{array} \right]$

\* Scale  $\rightarrow E_1/1, E_2/12, E_3/5$

$$\Rightarrow \left[ \begin{array}{ccc|c} 1 & 1 & -1 & 0 \\ 0 & 1 & -\frac{1}{12} & \frac{1}{3} \\ \frac{2}{5} & \frac{1}{5} & \frac{1}{5} & 1 \end{array} \right]$$

Compare elements in the first column. 1 is the largest.  
So no pivoting is needed.

Use  $E_3 - \frac{2}{5}E_1$  to eliminate  $\frac{2}{5}$

$$\Rightarrow \left[ \begin{array}{ccc|c} 1 & 1 & -1 & 0 \\ 0 & 1 & -\frac{1}{12} & \frac{1}{3} \\ 0 & -\frac{1}{5} & \frac{3}{5} & 1 \end{array} \right]$$

\* Scale =  $E_1/1, E_2/1, E_3/1$

$$\Rightarrow \left[ \begin{array}{ccc|c} 1 & 1 & -1 & 0 \\ 0 & 1 & -\frac{1}{12} & \frac{1}{3} \\ 0 & -\frac{1}{5} & \frac{3}{5} & 1 \end{array} \right]$$

Compare elements in the second column, below the diagonal line (including diagonal elements). 1 is the largest.

So no pivoting is needed.

Use  $E_3 + \frac{1}{5}E_2$  to eliminate  $-\frac{1}{5}$

$$\Rightarrow \left[ \begin{array}{ccc|c} 1 & 1 & -1 & 0 \\ 0 & 1 & -\frac{1}{12} & \frac{1}{3} \\ 0 & 0 & \frac{7}{12} & \frac{16}{15} \end{array} \right]$$

\* Use backward substitution to get  $x_3 = \frac{64}{35}, x_2 = \frac{17}{35}, x_1 = \frac{47}{35}$