Topic: Gaussian Elimination with partial pivoting
Read: chapter 14.3

Handwork problem:

HW5_1 Solve the following system of linear equations, using **Gaussian elimination with partial pivoting**

$$\begin{bmatrix} 3 & 1 & 5 & 5 \\ 4 & -4 & 5 & 0 \\ -4 & -2 & -4 & 3 \\ -5 & 1 & -5 & -4 \end{bmatrix} \begin{Bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{Bmatrix} = \begin{Bmatrix} 42 \\ -9 \\ -3 \\ -5 \end{Bmatrix}$$

Show all your work, explaining each step with words so that your work is easy to follow.

Coding problems:

HW5_2 A thin square metal plate has uniform temperature of E1 degrees on two opposite edges, a temperature of E2 on one edge, and E3 on the final edge. Equations can be written for the temperatures, Ti, at 6 uniformly spaced interior nodes. Solve for the node temperatures when E1=80, E2=120 and E3=60.

Present the results in a complete sentence using `fprintf`

$$4T_1 = E_1 + E_2 + T_2 + T_6$$
$$4T_2 = E_1 + T_1 + T_3 + T_5$$
$$4T_3 = E_1 + E_3 + T_2 + T_4$$
$$4T_4 = E_1 + E_3 + T_3 + T_5$$
$$4T_5 = E_1 + T_2 + T_4 + T_6$$
$$4T_6 = E_1 + E_2 + T_1 + T_5$$

HW5_3 Three carts, interconnected by springs, are subject to the loads P1, P2 and P3, as shown in the figure. The displacements of the carts, u_1, u_2 & u_3, are governed by the equilibrium equations:

Let $k_1=k_2=k_3=$ 25 N/m, $k_4=k_6=$10 N/m, $k_5=$5 N/m, $k_7=k_8=$2 N/m Let $P_1=P_2=P_3$ = 2N. Solve for the displacements. Present the results in a complete sentence using `fprintf`

$$P_1 - k_1u_1 + k_5(u_3 - u_1) + k_4(u_2 - u_1) = 0;$$
$$P_2 - k_2u_2 - k_4(u_2 - u_1) + k_6(u_3 - u_2) = 0;$$
$$P_3 - k_7u_3 - k_8u_3 - k_3u_3 - k_6(u_3 - u_2) - k_5(u_3 - u_1) = 0.$$