

You should type all of these into script files. The only output your scripts need to provide is the solution vector. Don't turn on rational formatting for this assignment.

- 1) (2 pts) Use MATLAB to solve the linear system

$$\begin{aligned} 3a - 2b + c &= 13 \\ a - b + c &= 10 \\ 3a + 2b - 3c &= -6. \end{aligned}$$

- 2) (2 pts) Use MATLAB to solve the linear system

$$\begin{aligned} a + b + c + d &= 2 \\ \sqrt{3}a - \sqrt{2}b + \ln(4)c - \sin(2)d &= 10 \\ a - b - c - d &= 2 \\ a - b - 2c + 3d &= -3. \end{aligned}$$

- 3) (3 pts) Use MATLAB to solve the linear system below. Be careful with your coefficient matrix for this problem

$$\begin{aligned} a + b + c &= 1 \\ c - b - a &= 2 \\ b - a + 2c &= 3. \end{aligned}$$

- 4) (3 pts) Repeat the first three problems, but in each case, replace the right-hand side vector with all zeros. What do you observe about the solutions you get?
- 5) (12 pts) Solve the problem below to find the forces at each of the numbered beams. Hints:

- Remember to put each equation in standard form before setting up the coefficient matrix and right hand side. For example, the first equation is

$$f_2 = f_6.$$

Write this as

$$f_2 - f_6 = 0.$$

The above equation means that you should have a 1 in column 2 (for the coefficient of f_2), a -1 in column 6 (for the coefficient of f_6) and zeros everywhere else. You should have a 0 in the right-hand side vector.

- The coefficient matrix is going to be 13×13 . Don't try to set this up as one giant matrix. You can enter elements a row at a time using the syntax

```
A(1,:) = [... ..]    % Row 1
A(2,:) = [... ..]    % Row 2
```

- It will be helpful to define $a = \frac{1}{\sqrt{2}}$.

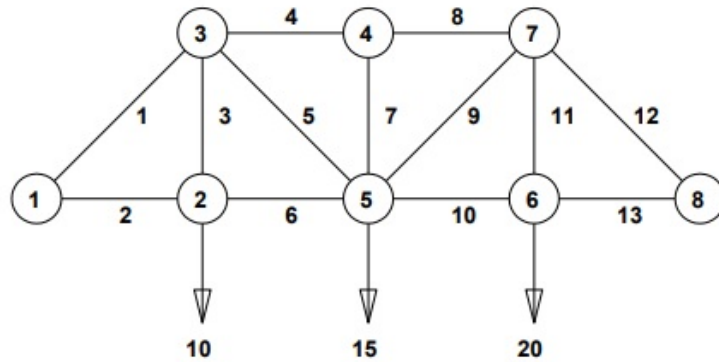


Figure 2.6. A plane truss.

cally. Resolving the member forces into horizontal and vertical components and defining $\alpha = 1/\sqrt{2}$, we obtain the following system of equations for the member forces f_i :

$$\begin{aligned}
 \text{Joint 2:} \quad & f_2 = f_6, \\
 & f_3 = 10; \\
 \text{Joint 3:} \quad & \alpha f_1 = f_4 + \alpha f_5, \\
 & \alpha f_1 + f_3 + \alpha f_5 = 0; \\
 \text{Joint 4:} \quad & f_4 = f_8, \\
 & f_7 = 0; \\
 \text{Joint 5:} \quad & \alpha f_5 + f_6 = \alpha f_9 + f_{10}, \\
 & \alpha f_5 + f_7 + \alpha f_9 = 15; \\
 \text{Joint 6:} \quad & f_{10} = f_{13}, \\
 & f_{11} = 20; \\
 \text{Joint 7:} \quad & f_8 + \alpha f_9 = \alpha f_{12}, \\
 & \alpha f_9 + f_{11} + \alpha f_{12} = 0; \\
 \text{Joint 8:} \quad & f_{13} + \alpha f_{12} = 0.
 \end{aligned}$$

Figure 1: Taken from *Numerical Computing in Matlab*, Cleve Moler.