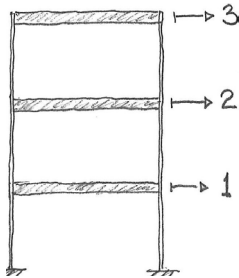


## Home Exercise 2

Consider a three storey shear building with system matrices  $\mathbf{m}$  and  $\mathbf{k}$ . You are supposed to use Calfem to obtain the natural frequencies and modes for the frame and also a steady state harmonic response for a frequency sweep.



$$\mathbf{k} = \mathbf{k} \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 1 \end{bmatrix} \quad \mathbf{m} = \mathbf{m} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

- Use the Calfem-function `eigen` to determine the modes and the corresponding natural frequencies. Put  $k=1$  and  $m=1$ . Sketch the mode shapes you obtain and give the corresponding angular frequencies.
- Put a force  $p_0 \sin \omega t$  in all dofs. Determine the steady state response in all dofs for  $0 < \omega < 3$ . Use the Calfem function `solveq` with the force amplitude  $p_0=1$ . Show the results in three plots showing amplitudes  $u_{i0}=u_{i0}(\omega)$  for  $i=1, 2$ , and 3.