

Question 1

(1) Generalized stiffness K

$$K = \begin{bmatrix} 60 & -12 & -6 \\ -12 & 12 & 6 \\ -6 & 6 & 4 \end{bmatrix} K = \begin{bmatrix} 60 & -12 & -6 \\ -12 & 12 & 6 \\ -6 & 6 & 4 \end{bmatrix}^2$$

$$= \begin{bmatrix} 120 & -24 & -6 \\ -24 & 24 & 6 \\ -12 & 6 & 4 \end{bmatrix}$$

(2) ω_n is $\det[K - \omega^2 M] u = 0$

$$Ku - \omega^2 Mu = 0$$

$$\omega^2 Mu = Ku$$

$$\omega^2 = \frac{Ku}{Mu}$$

$$\omega^2 = \frac{k}{m}$$