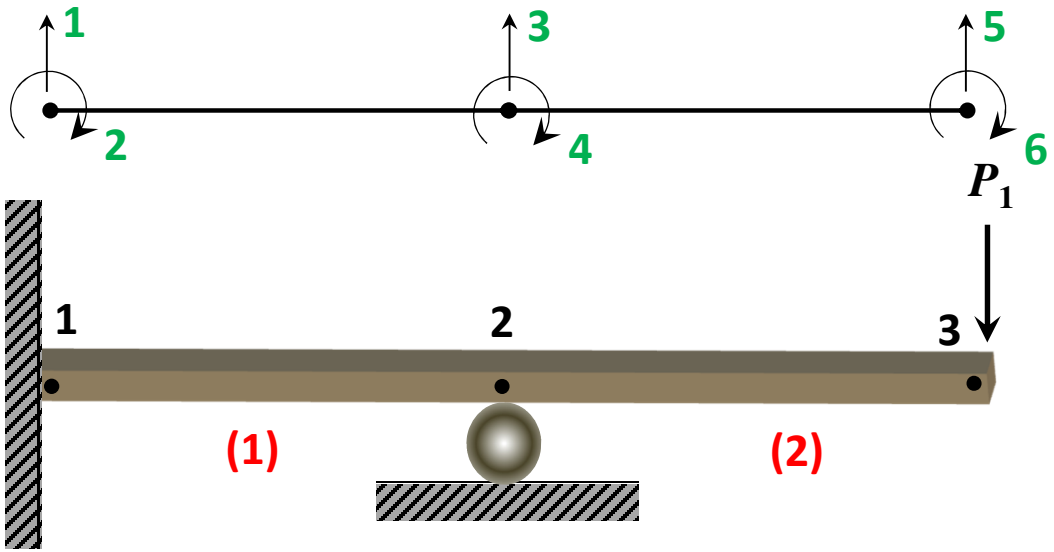
Day 3: Problem 1 (Tutorials):

To find (a) deflection and (b)shearing force of the given system using beam element



Applied Load

$P_1 = 2000$ N

$E = 2.1\times10^{11}$ N/m^2 $I = 2.509\times10^{-5}$ m^4 $L_1 = L_2 = 500$ cm

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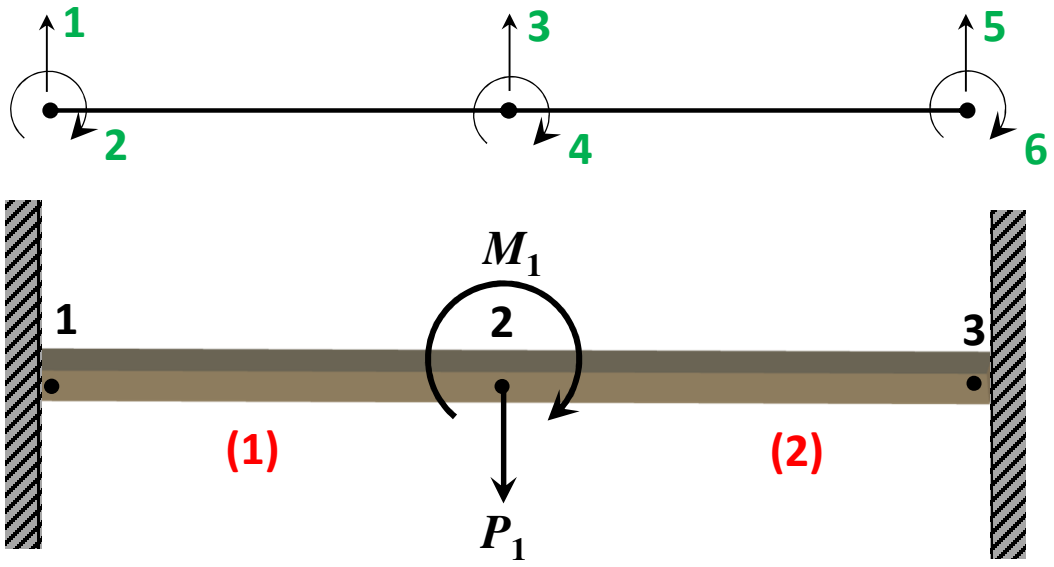
Day 3: Problem 2 (Home work):

To find (a) deflection and (b)shearing force of the given system using beam element



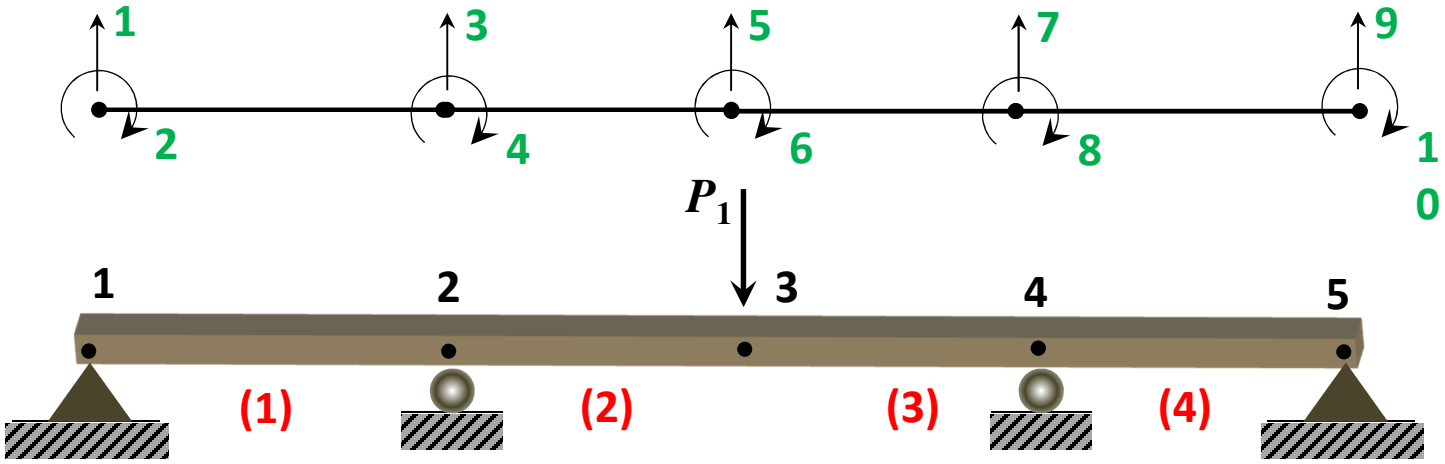
Applied Load

$P_1 = 10000$ N
$M_1 = 20000$ N-m

$E = 2.1\times10^{11}$ N/m^2 $I = 4.0\times10^{-4}$ m^4 $L_1 = L_2 = 3$ m

Day 3: Problem 3 (Home work):

To find (a) deflection and (b)shearing force of the given system using beam element



$E = 70\times10^{9}\ \text{N/m}^2$

$I = 1\times10^{-4}\ \text{m}^4$

$L_1 = L_4 = 3\ \text{m}$

$L_2 = L_3 = 2\ \text{m}$

Applied Load

$P_1 = 8000\ \text{N}$

Local stiffness matrix

$$K^{(i)} = \frac{EI}{L^3}\begin{bmatrix} 12 & 6L & -12 & 6L \\ 6L & 4L^2 & -6L & 2L^2 \\ -12 & -6L & 12 & -6L \\ 6L & 2L^2 & -6L & 4L^2 \end{bmatrix}$$

X Transformation Matrix