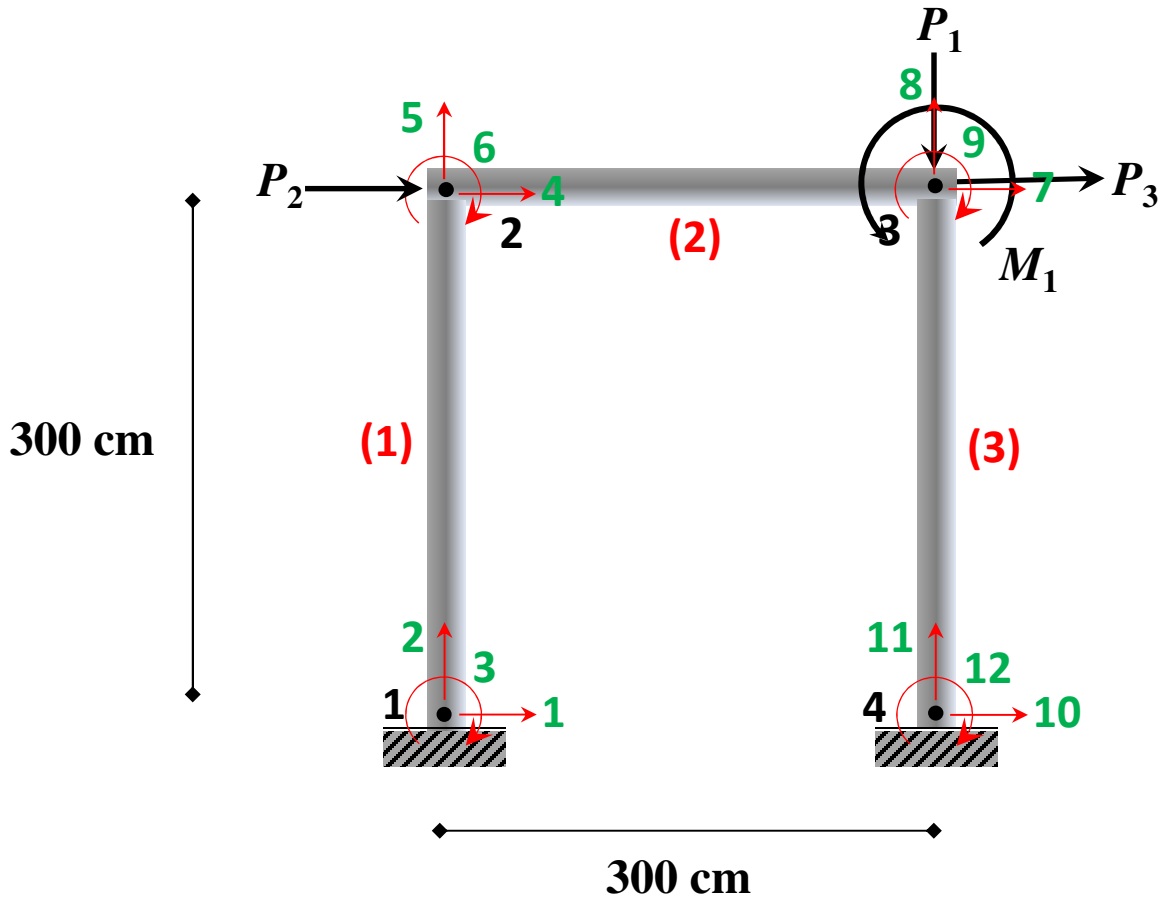
## Day 4: Problem 1 (Tutorials):

**Program to find (a) displacements, (b) axial force, (c) shear force and (d) bending moment of 2D portal frame**



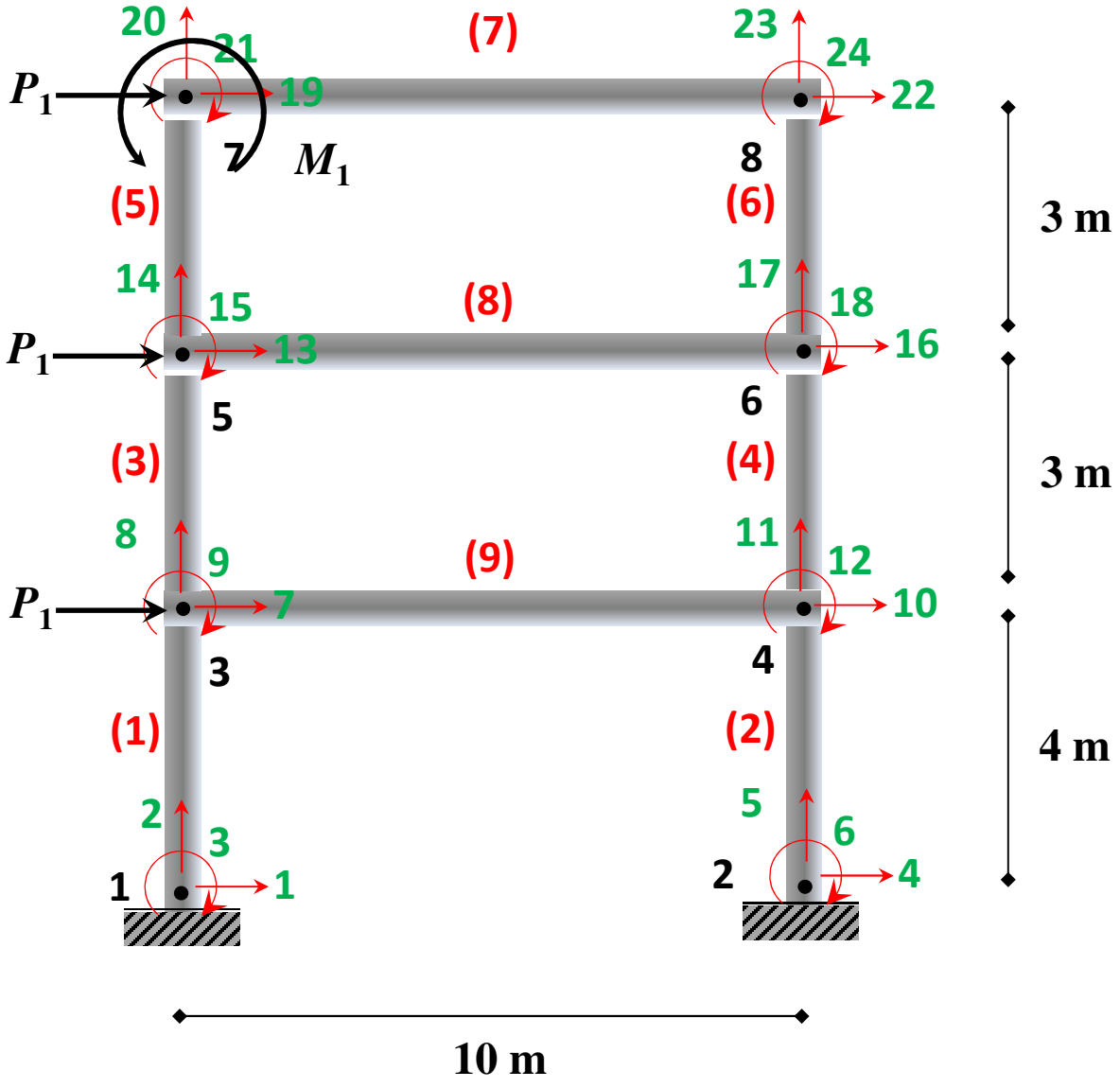

**Applied Load**

$P_1 = 5000$ N
$P_2 = 10000$ N
$P_3 = 10000$ N
$M_1 = 500$ N-m

$E = 2.1\times10^{11}$ N/m$^2$ $I = 0.8\times10^{-4}$ m$^4$ $L_1 = L_2 = L_3 = 300$ cm

## Day 4: Problem 2 (Home work):

PAGE 287 P5-33

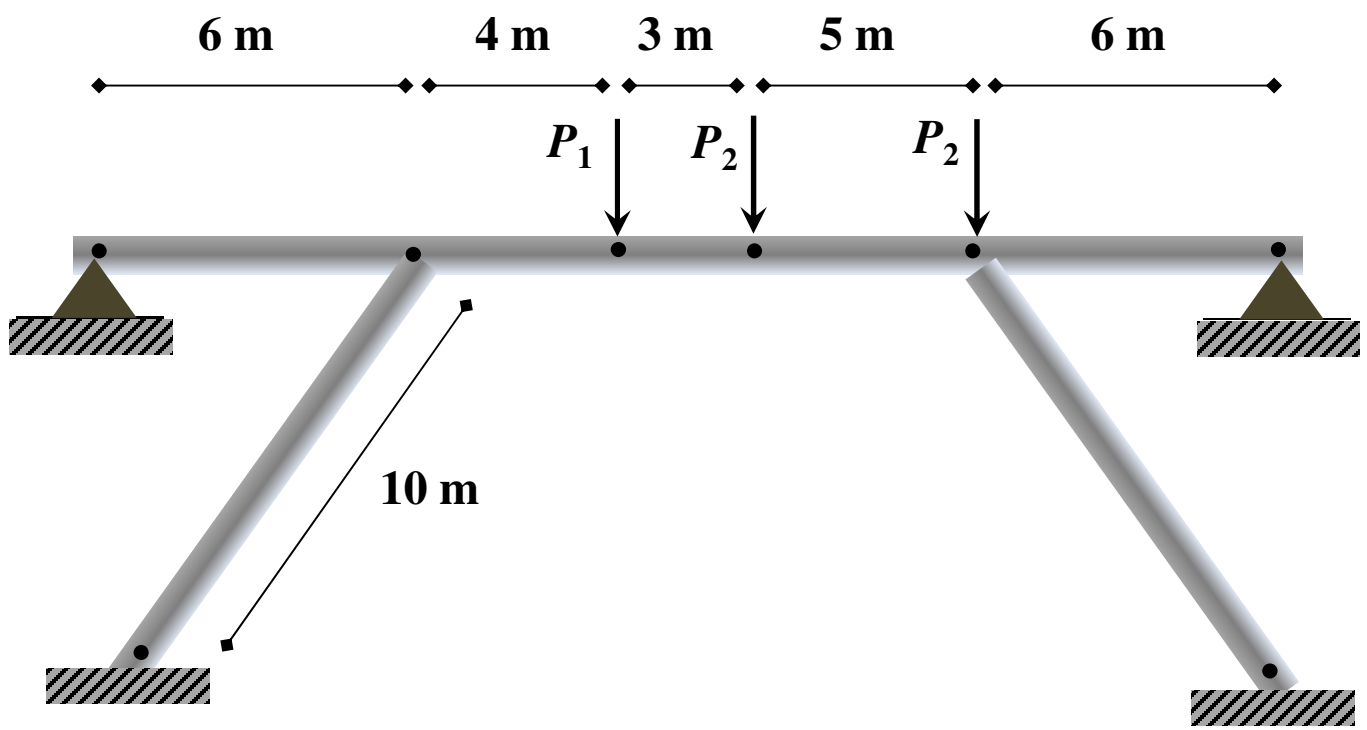



**Applied Load**

$P_1 = 20000$ N
$M_1 = 60000$ N-m

## Day 4: Problem 3 (Home work):

PAGE 287 P5-37




**Applied Load**

$P_1 = 18000$ N
$P_2 = 72000$ N

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