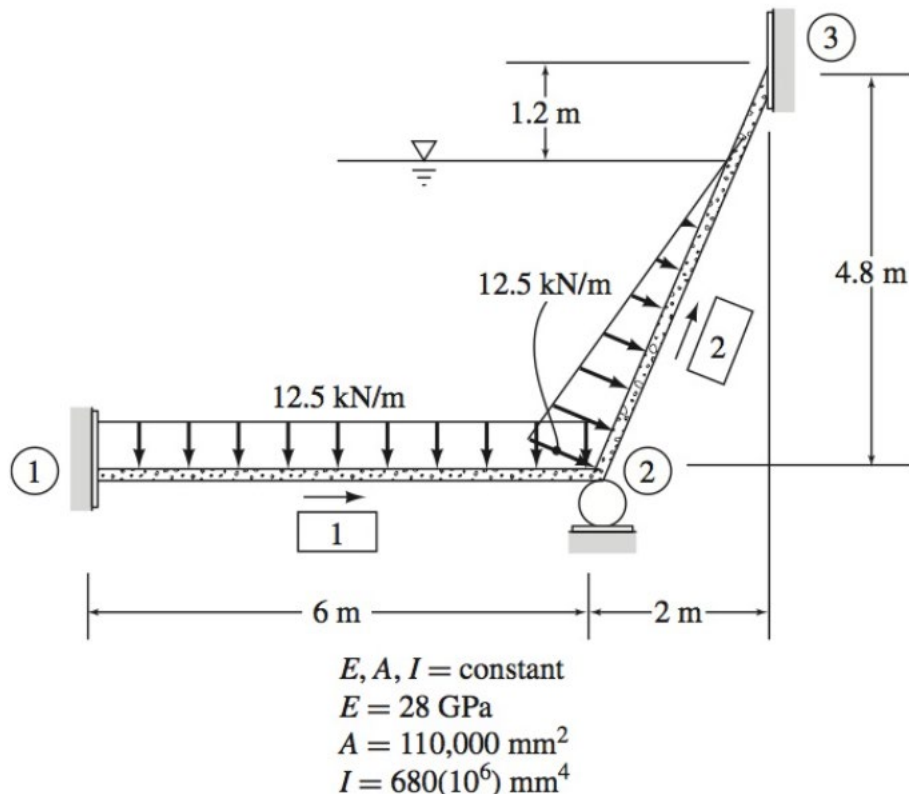**Department of Civil and Environmental Engineering**

CIVE 4320/5320 – Computer-Aided Analysis of Structures
Tutorial 3 Example (Matrix Stiffness Method: Frames)

1. Use SAP2000 to determine the joint displacements, member local end forces, and support reactions for the frame shown.

$E, A, I = $ constant
$E = 28$ GPa
$A = 110,000$ mm^2
$I = 680(10^6)$ mm^4

Your SAP2000 submission must include the followings:

a) A joint displacements table which will have four columns as follows: Joint No, X Disp. (mm), Y Disp. (mm) and Rotation (rad). Use positive values for the positive global coordinate system directions.

b) A support reaction table which will have 3 columns as follows: Joint, X-Reaction (kN), Y-Reaction (kN) and Z-Moment (kNm). The table will have three lines: from Joint 1 and Joint 3. Use positive values for the positive global coordinate system directions.

c) Print the shear and moment diagrams with peak values shown on the diagrams. Plot positive values above the horizontal axis. Compare the results with hand calculations.

d) Print the deflected shape, superimposed on the undeflected shape, from SAP2000 as a part of your submission.