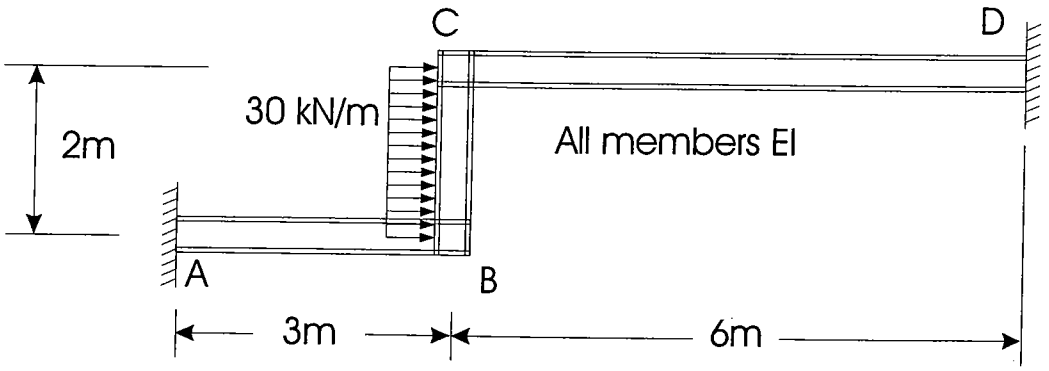
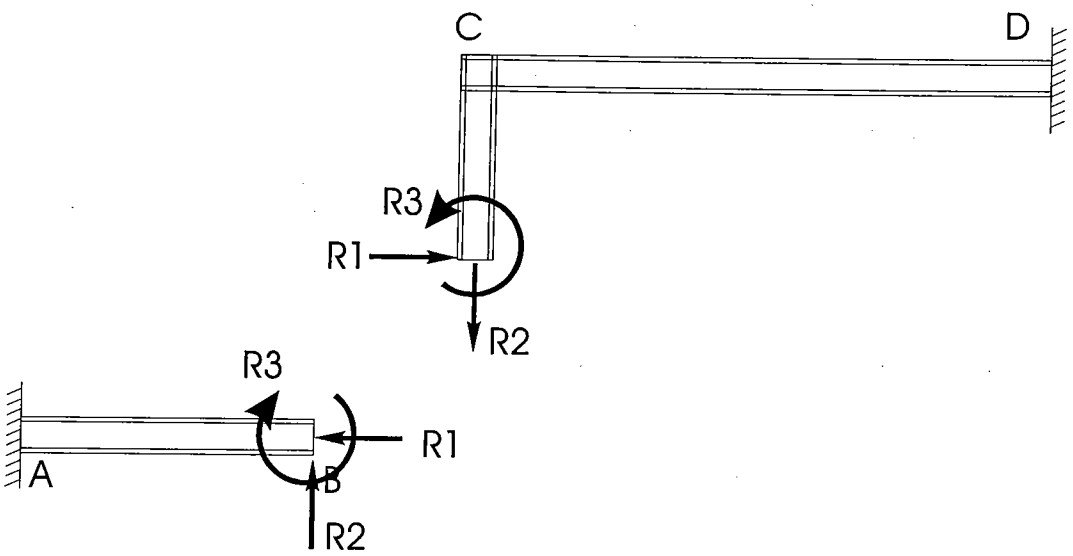
CVEN 345

Name MINI EXAM # 2 Seat Number _____

REAL STRUCTURE AND LOADS



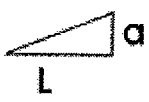
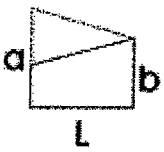
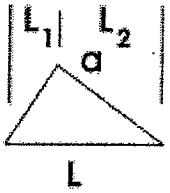
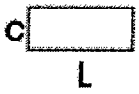
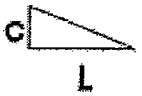
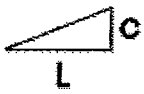
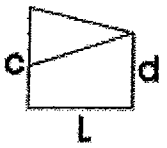
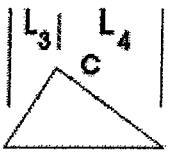
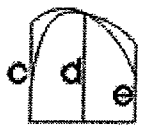
RELEASED STRUCTURE AND REDUNDANTS



SOLVE FOR Δ_{10} and δ_{23}

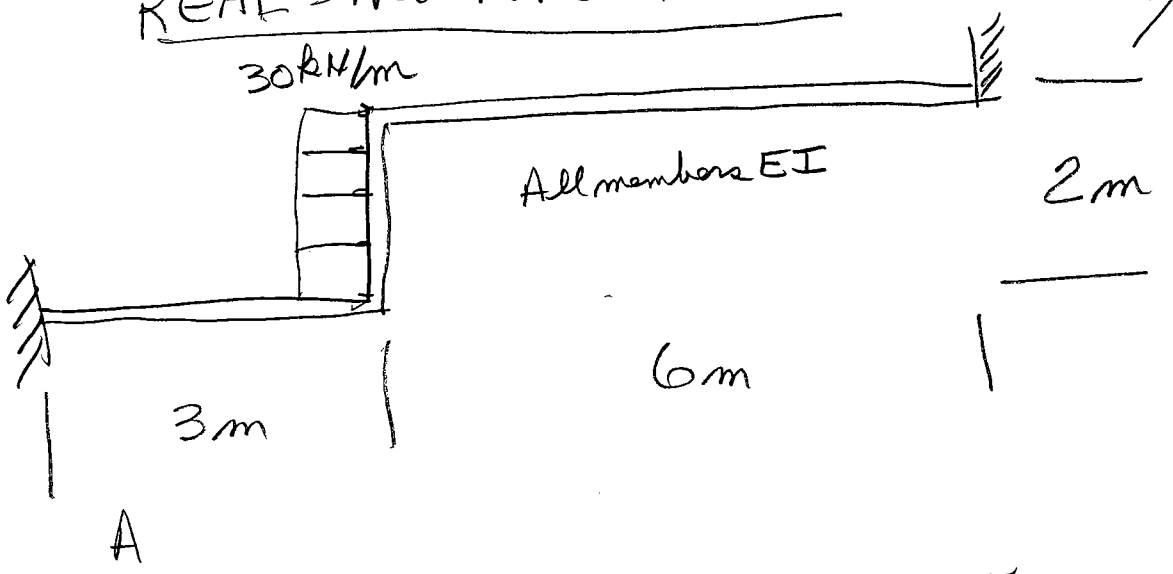
Show all necessary moment diagrams.
Show the requested deflections on the released structure.

VOLUME INTEGRALS

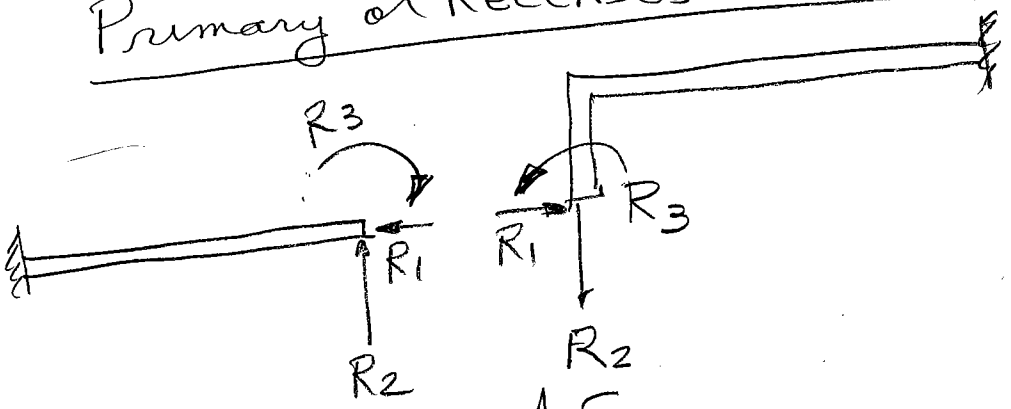
					
	Lac	$\frac{Lac}{2}$	$\frac{Lac}{2}$	$\frac{Lc(a+b)}{2}$	$\frac{Lac}{2}$
	$\frac{Lac}{2}$	$\frac{Lac}{3}$	$\frac{Lac}{6}$	$\frac{Lc(2a+b)}{6}$	$\frac{(L+L_2)ac}{6}$
	$\frac{Lac}{2}$	$\frac{Lac}{6}$	$\frac{Lac}{3}$	$\frac{Lc(a+2b)}{6}$	$\frac{(L+L_1)ac}{6}$
	$\frac{La(c+d)}{2}$	$\frac{La(2c+d)}{6}$	$\frac{La(2d+c)}{6}$	$\frac{La(2c+d)+Lb(c+2d)}{6}$	$\frac{ac(L+L_2)+ad(L+L_1)}{6}$
	$\frac{Lac}{2}$	$\frac{(L+L_4)ac}{6}$	$\frac{(L+L_3)ac}{6}$	$\frac{ac(L+L_4)+bc(L+L_3)}{6}$	For $L_3 <= L_1$ $\frac{acL(2-((L_1-L_3)^2/L_1L_4))}{6}$
	$\frac{La(c+4d+e)}{6}$	$\frac{La(c+2d)}{6}$	$\frac{La(e+2d)}{6}$	$\frac{La(c+2d)+Lb(2d+e)}{6}$	

L is the length of the member
d is the central ordinate of the parabola
Any of the parabola values can be negative
The trapezoid c value can be smaller or greater than d

REAL STRUCTURE & LOADS

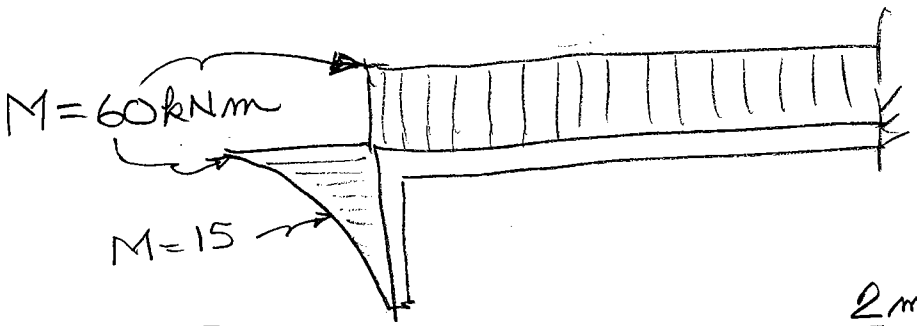


Primary or RELEASED STRUCTURE

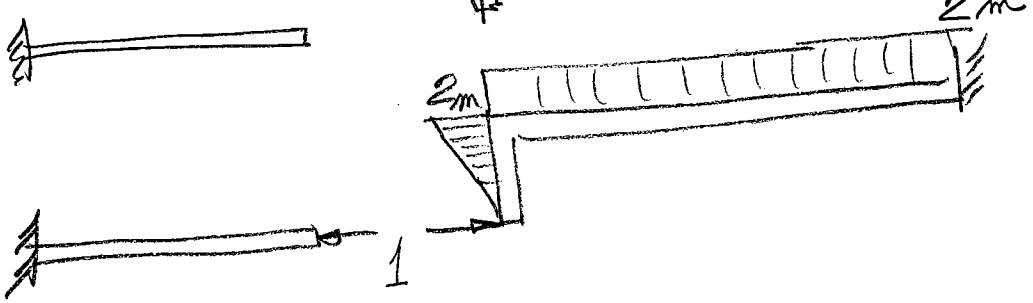


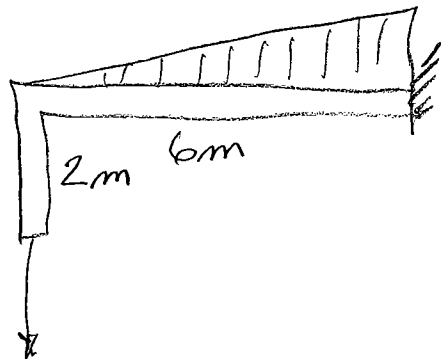
Solve for Δ_{10} and δ_{23}

M_0

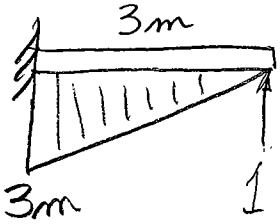


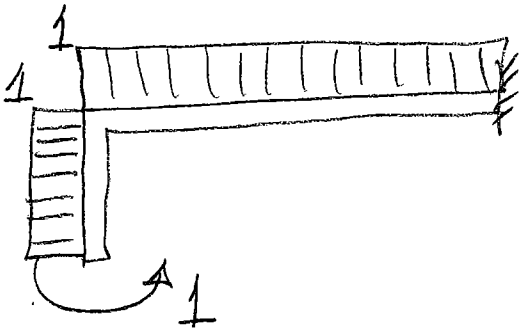
m_1



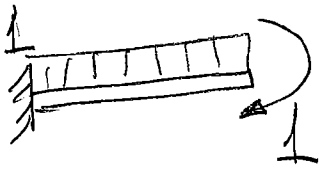


m_2

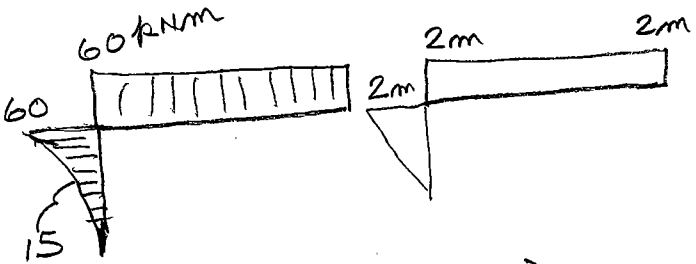




m_3



$$\Delta_{10} = \int \frac{M_0 m_1 dx}{EI}$$

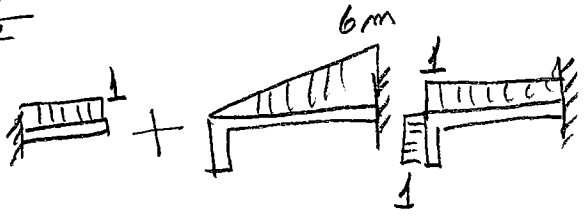


$$= \quad + \quad$$

$$= 0 + \frac{(2m)(2m)\left[60 + 2(15)\right]kNm}{6EI} + \frac{(6m)(60kNm)(2m)}{EI}$$

$$= \frac{60}{EI} + \frac{720}{EI} = + \frac{780 kNm^3}{EI\, kN/m^2}$$

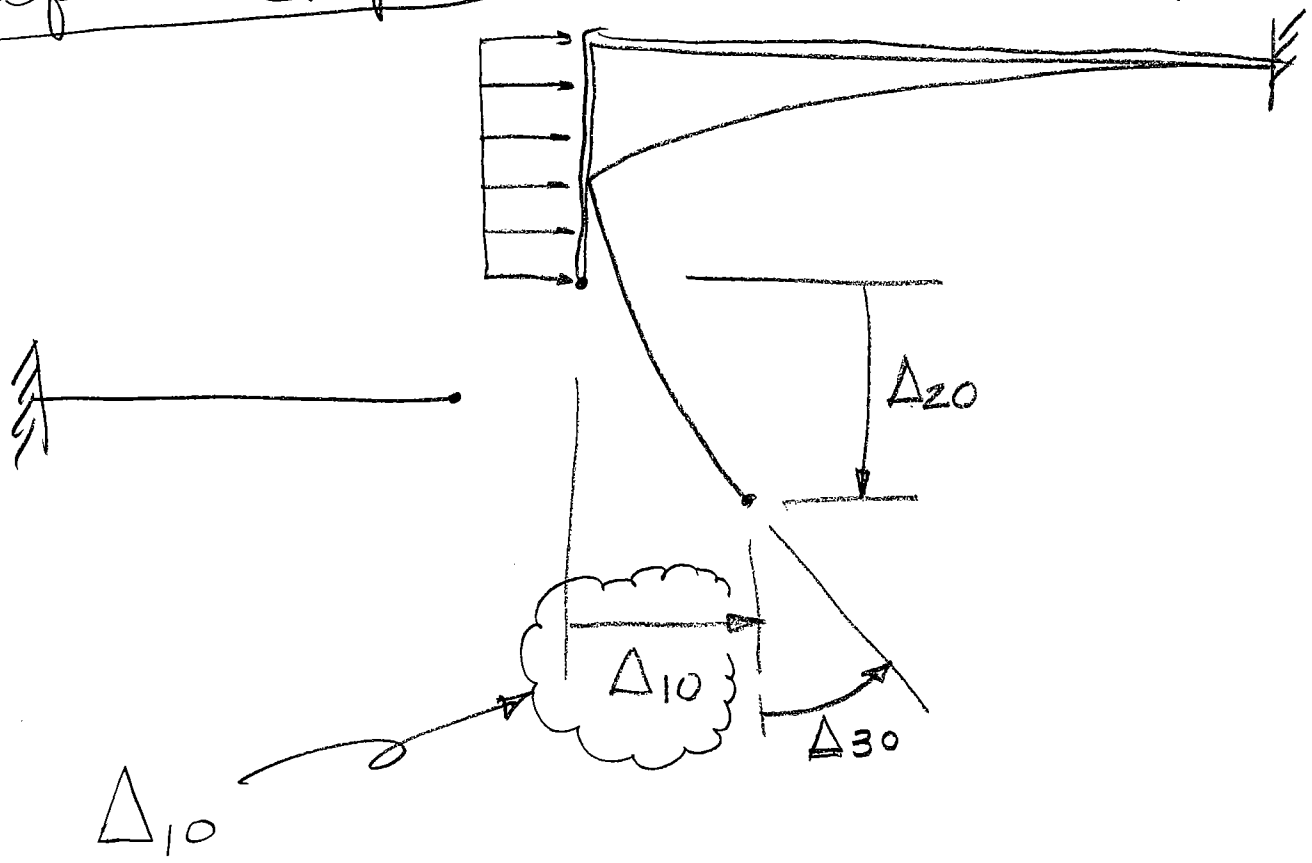
$$\delta_{23} = \int \frac{m_2 m_3 dx}{EI} =$$

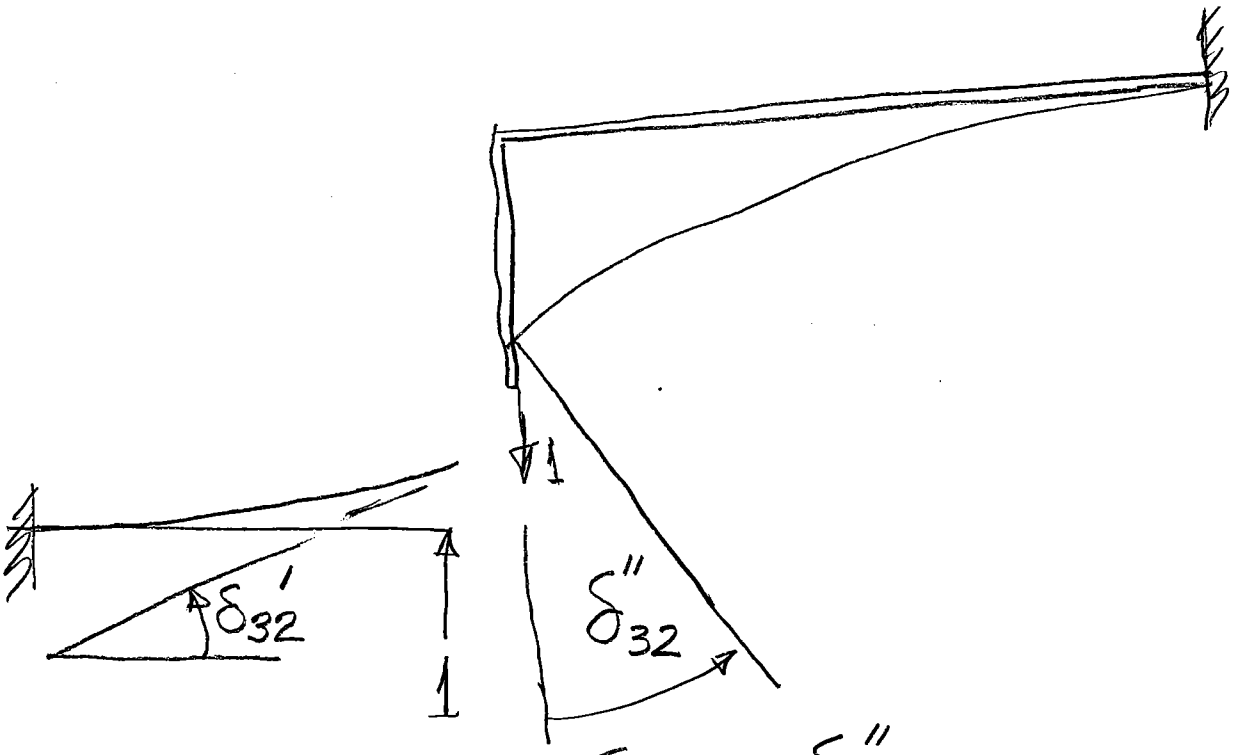


$$\frac{(-3m)(3m)(1)}{2EI} + \frac{(6m)(6m)(1)}{2EI}$$

$$-\frac{4.5}{EI} + \frac{18}{EI} = + \frac{13.5}{EI}$$

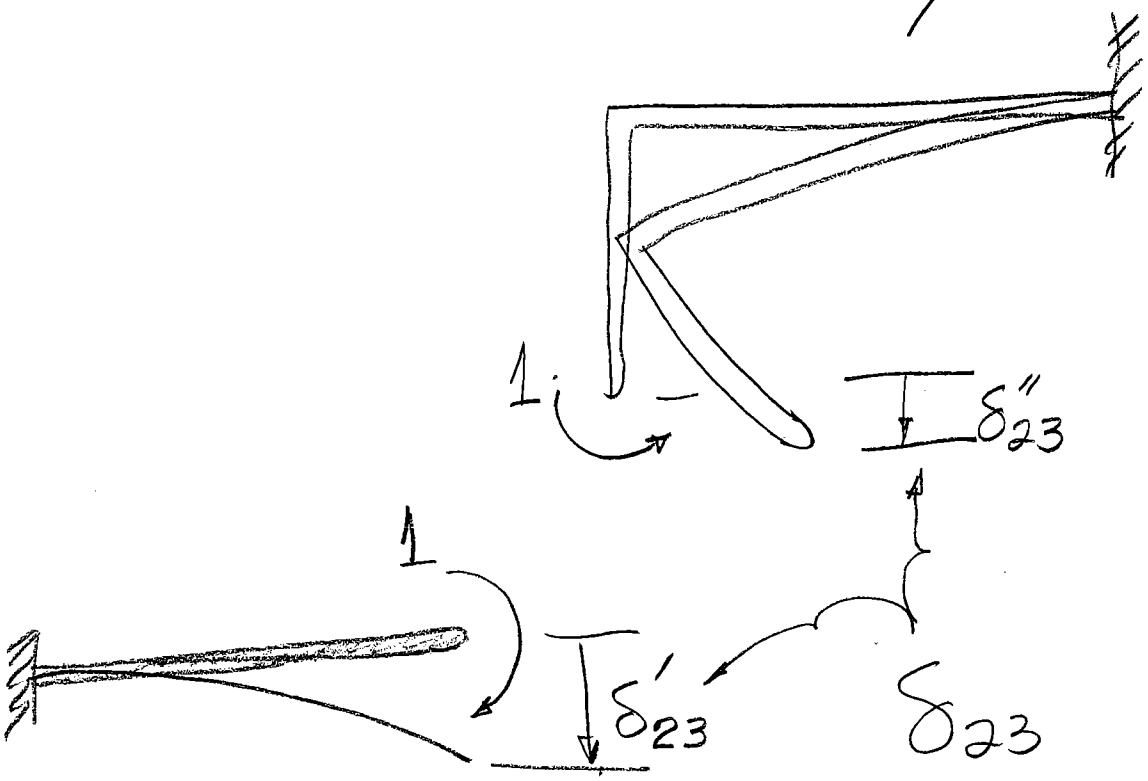
Deflected Shapes





$$\delta_{32} = \delta'_{32} + \delta''_{32}$$

4/

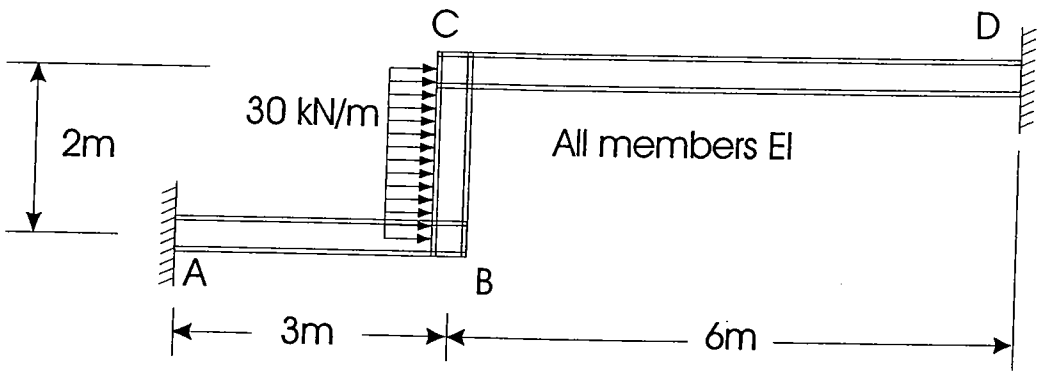


$$\delta_{23} = \delta'_{23} + \delta''_{23}$$

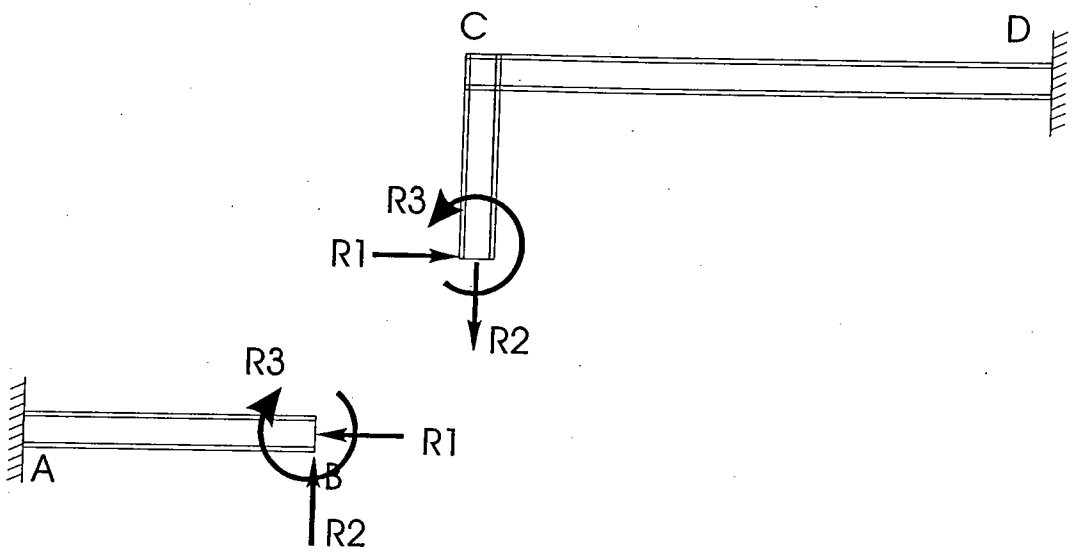
CVEN 345

Name MINI EXAM # 2 Seat Number _____

REAL STRUCTURE AND LOADS



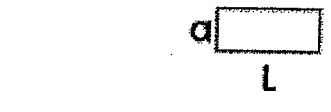
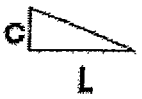
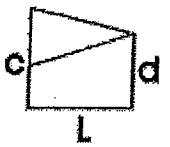
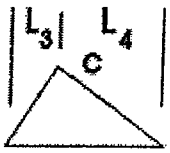
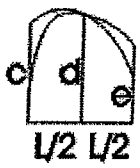
RELEASED STRUCTURE AND REDUNDANTS



SOLVE FOR Δ_{10} and δ_{23}

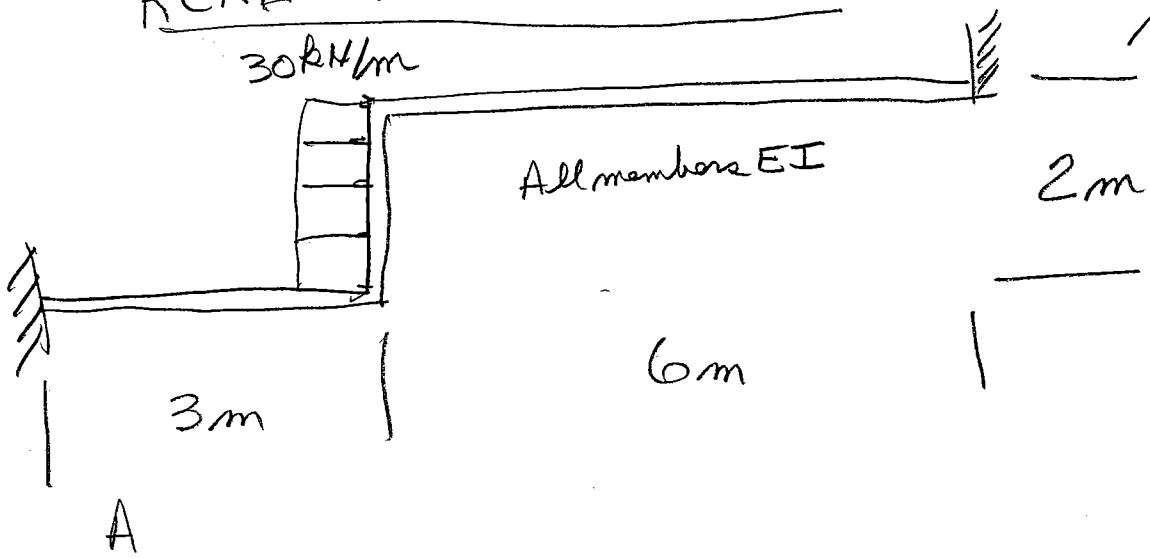
Show all necessary moment diagrams.
Show the requested deflections on the released structure.

VOLUME INTEGRALS

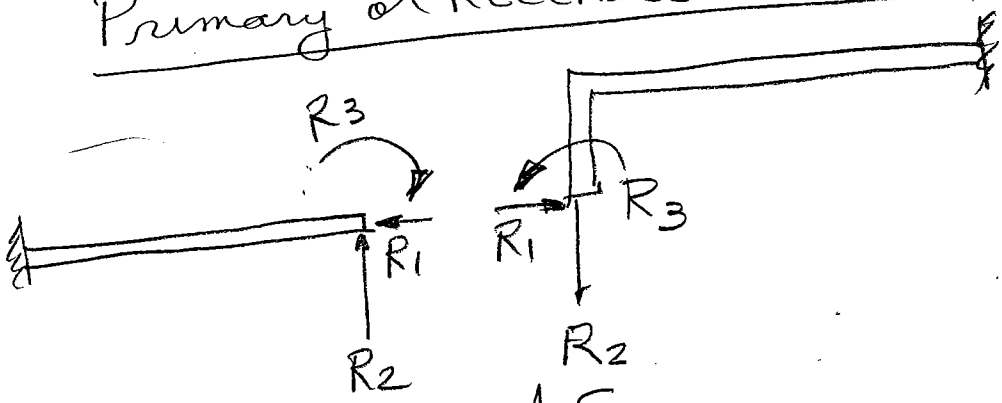
	Lac	$\frac{Lac}{2}$	$\frac{Lac}{2}$	$\frac{Lc(a+b)}{2}$	$\frac{Lac}{2}$
	$\frac{Lac}{2}$	$\frac{Lac}{3}$	$\frac{Lac}{6}$	$\frac{Lc(2a+b)}{6}$	$\frac{(L+L_2)ac}{6}$
	$\frac{Lac}{2}$	$\frac{Lac}{6}$	$\frac{Lac}{3}$	$\frac{Lc(a+2b)}{6}$	$\frac{(L+L_1)ac}{6}$
	$\frac{La(c+d)}{2}$	$\frac{La(2c+d)}{6}$	$\frac{La(2d+c)}{6}$	$\frac{La(2c+d)+Lb(c+2d)}{6}$	$\frac{ac(L+L_2)+ad(L+L_1)}{6}$
	$\frac{Lac}{2}$	$\frac{(L+L_4)ac}{6}$	$\frac{(L+L_3)ac}{6}$	$\frac{ac(L+L_4)+bc(L+L_3)}{6}$	For $L_3 <= L_1$ $\frac{acL(2-((L_1-L_3)^2/L_1L_4))}{6}$
	$\frac{La(c+4d+e)}{6}$	$\frac{La(c+2d)}{6}$	$\frac{La(e+2d)}{6}$	$\frac{La(c+2d)+Lb(2d+e)}{6}$	

L is the length of the member
d is the central ordinate of the parabola
Any of the parabola values can be negative
The trapezoid c value can be smaller or greater than d

REAL STRUCTURE & LOADS

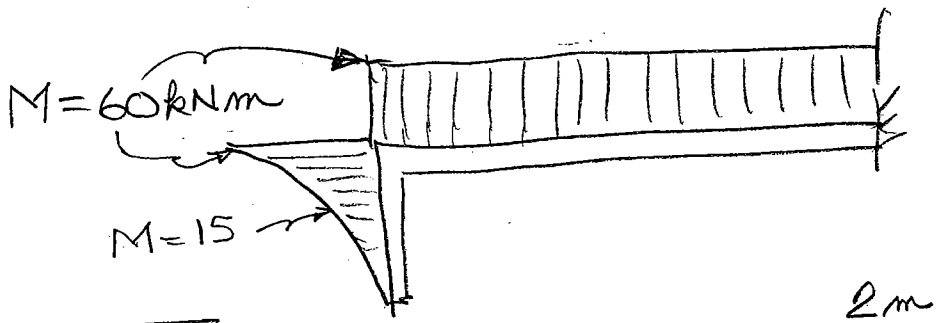


Primary or RELEASED STRUCTURE

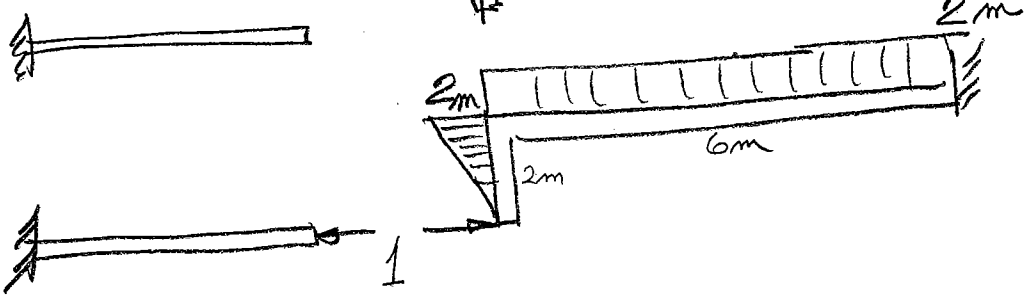


Solve for Δ_{10} and δ_{23}

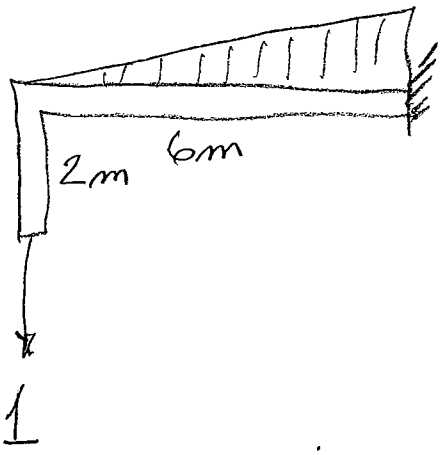
M_0



m_1

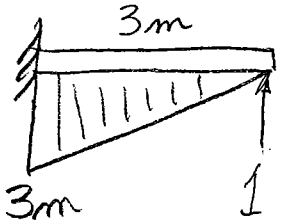


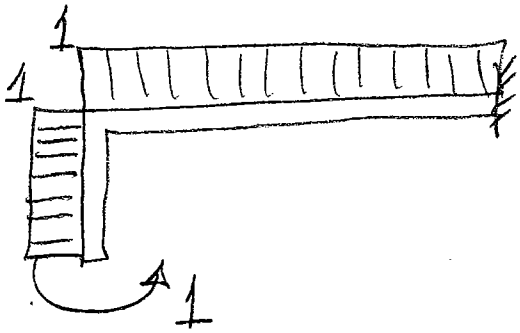
2/



-10

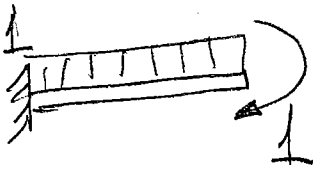
m_2



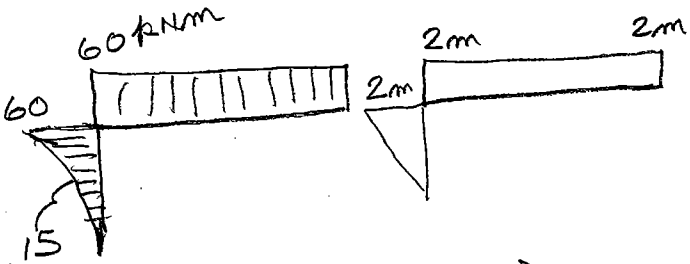


-10

m_3



$$\Delta_{10} = \int \frac{M_0 m_1 dx}{EI}$$



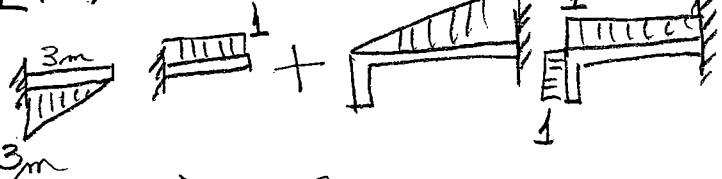
$$= \quad + \quad +$$

$$= 0 + \frac{(2m)(2m)[60 + 2(15)]\,kNm}{6EI} + \frac{(6m)(60\,kNm)(2m)}{EI}$$

-20

$$= \frac{60}{EI} + \frac{720}{EI} = + \frac{780\,kNm^3}{EI\,kN/m^2} = m$$

$$\delta_{23} = \int \frac{m_2 m_3 dx}{EI} =$$



$$\frac{(-3m)(3m)(1)}{2EI} + \frac{(6m)(6m)(1)}{2EI} \frac{m^2}{kN\,m^2}$$

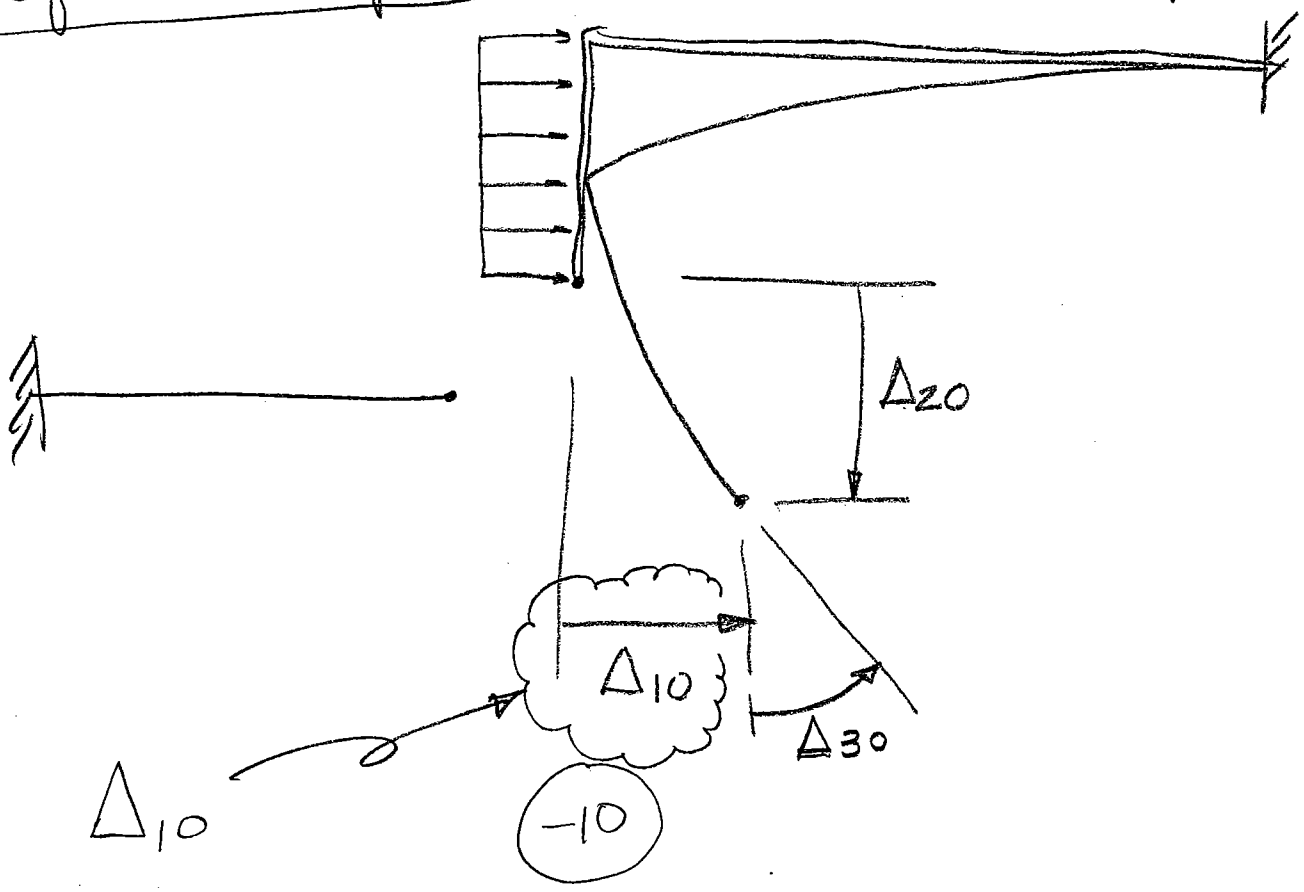
$$-\frac{4.5}{EI} + \frac{18}{EI} = + \frac{13.5}{EI}$$

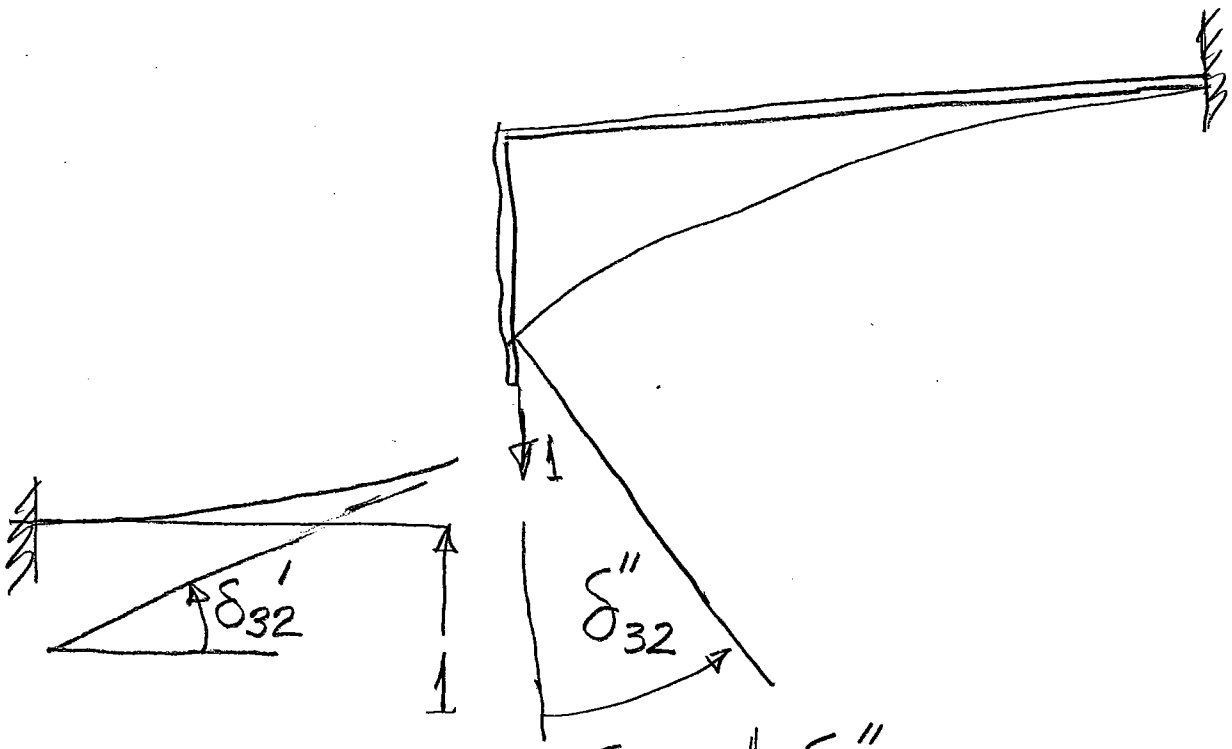
-20

Drawn on wrong side

-3

Deflected Shapes

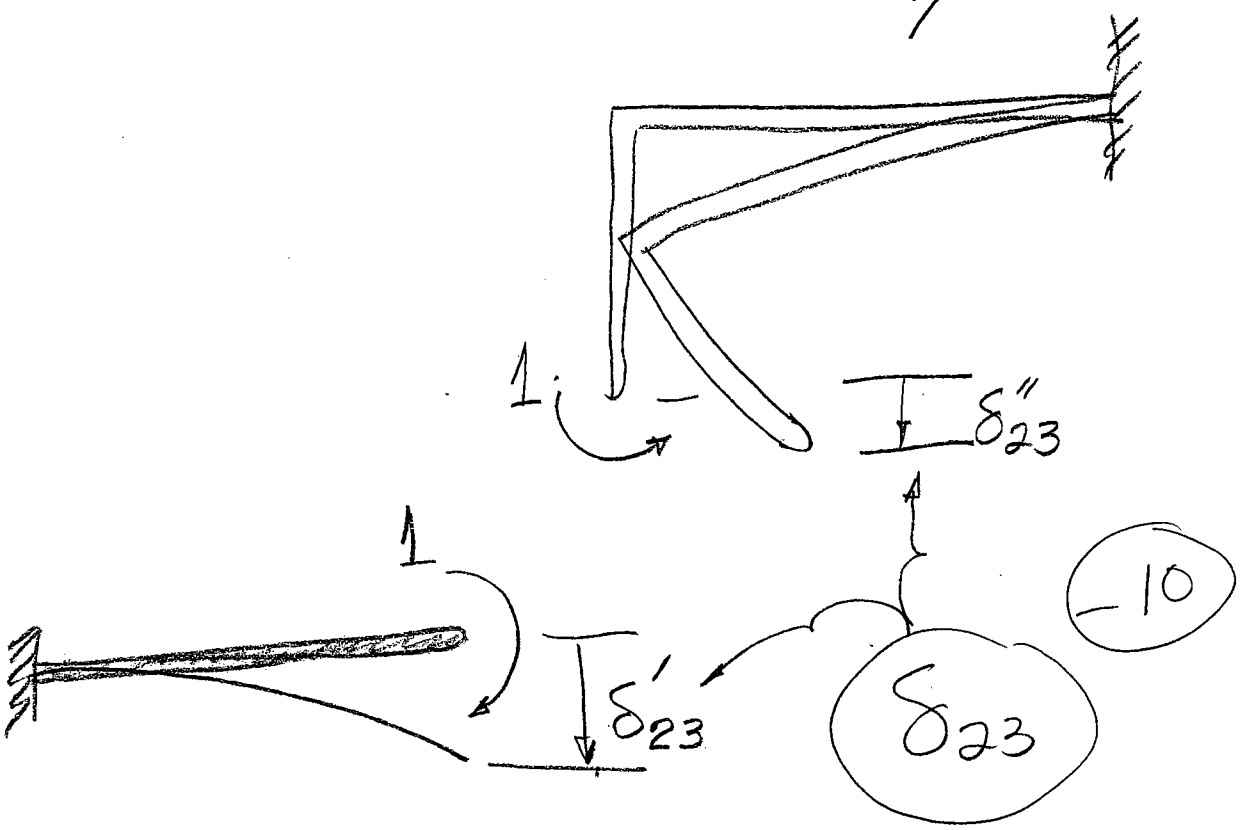




$$\delta_{32} = \delta_{32}' + \delta_{32}''$$

Both counterclockwise so take difference for δ_{32}

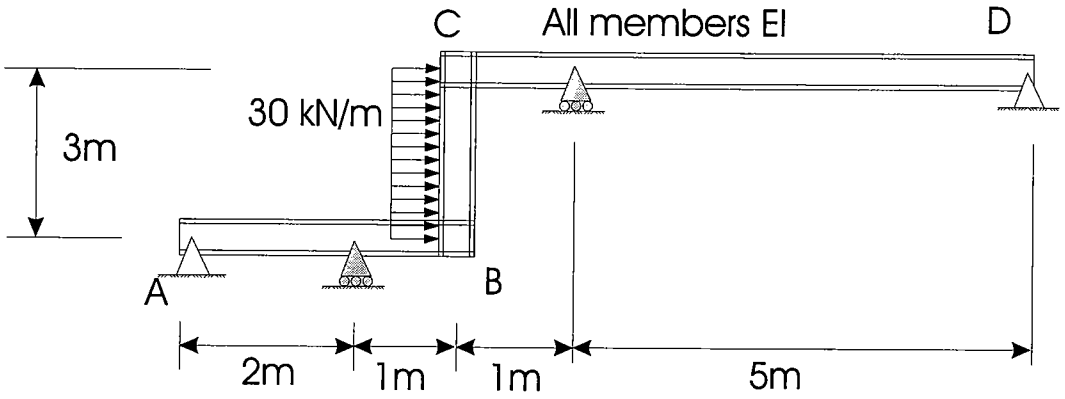
4/



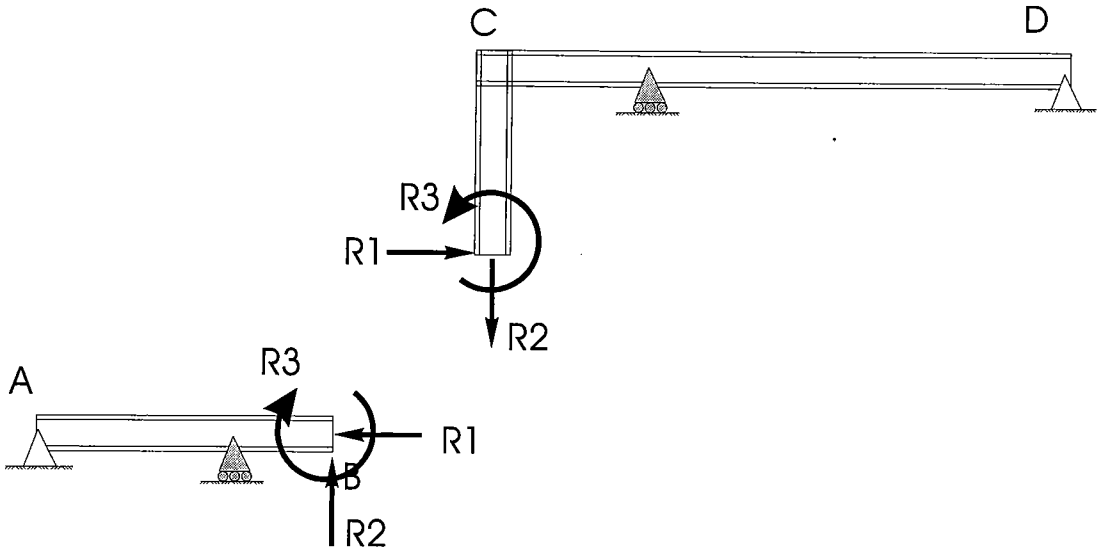
$$\delta_{23} = \delta''_{23} + \delta'_{23}$$

MINI QUIZ #2 Makeup

REAL STRUCTURE AND LOADS



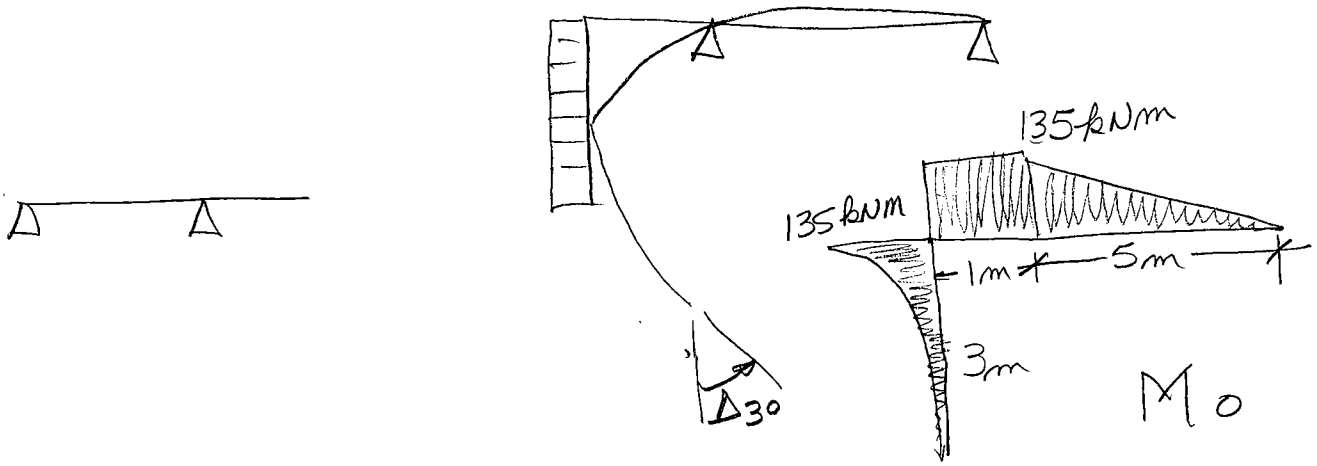
RELEASED STRUCTURE AND REDUNDANTS

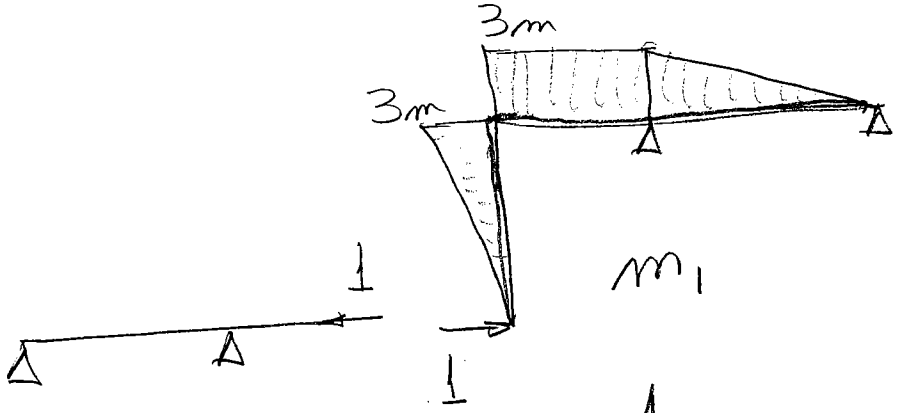


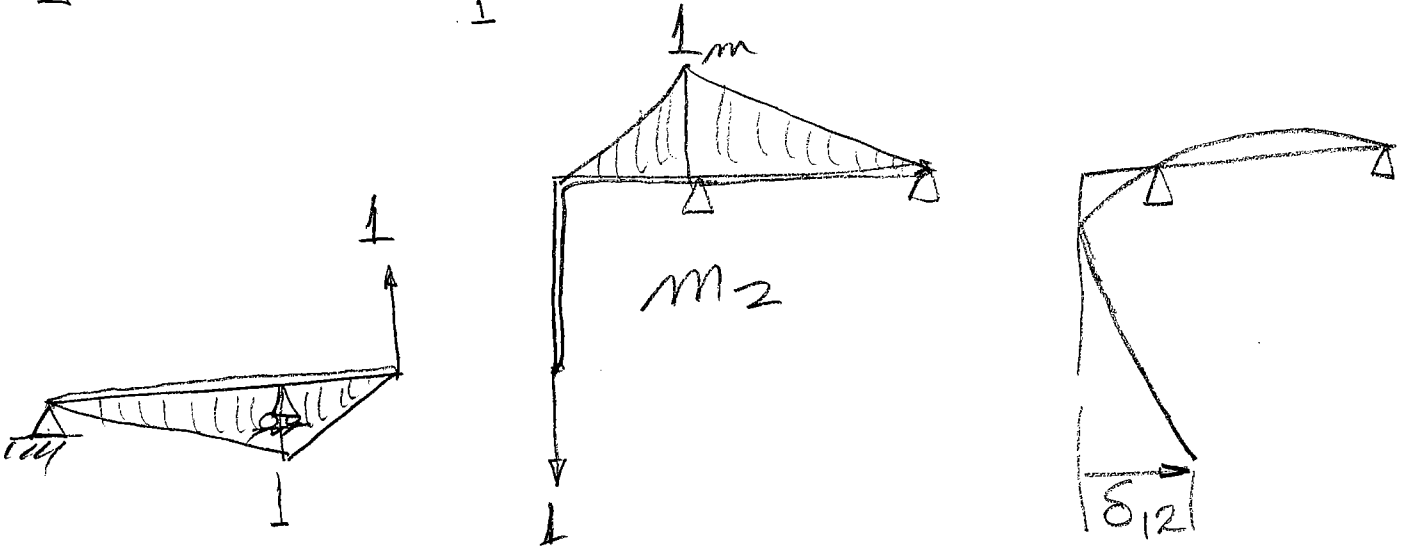
Solve for Δ_{30} and δ_{12}

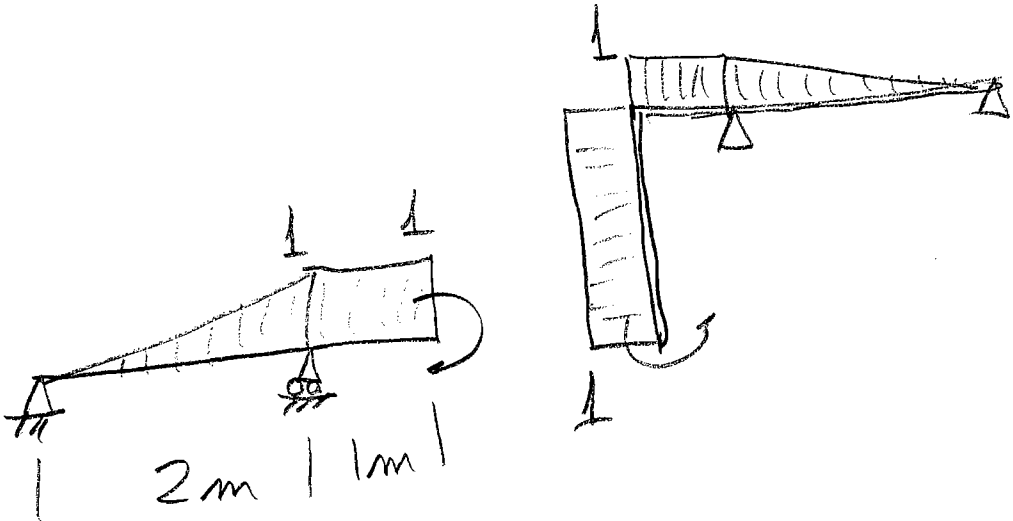
Show all necessary moment diagrams

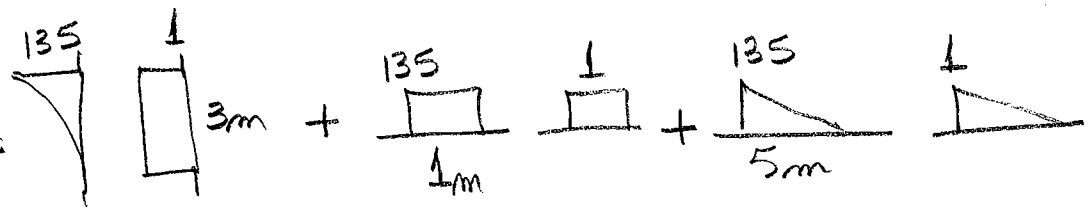
Show the requested deflections on the structure


135 kNm
135 kNm
1m
5m
3m
30°
M o


3m
3m
1
1
m 1

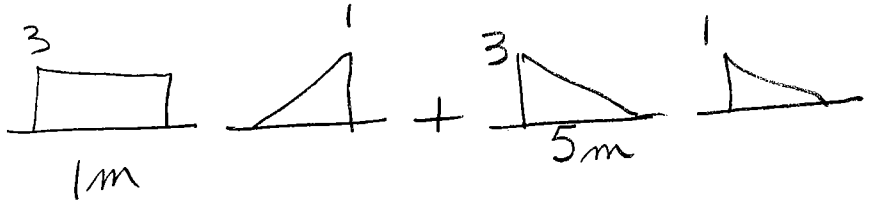

1m
m 2
1
1
1
δ 12


1
1
1
1
2m
1m

$\Delta_{30} =$ 

$= \frac{1}{3}(135)(1)(3m) + (135)(1)(1) + \frac{1}{3}(135)(1)(5m)$

$\Delta_{30} = \frac{495}{EI}$

$\delta_{12} = 0 +$ 

$= \frac{(3)(1)(1)}{2} + \frac{1}{3}\frac{(3)(1)(5)}{}$

$= \frac{6.5}{EI}$