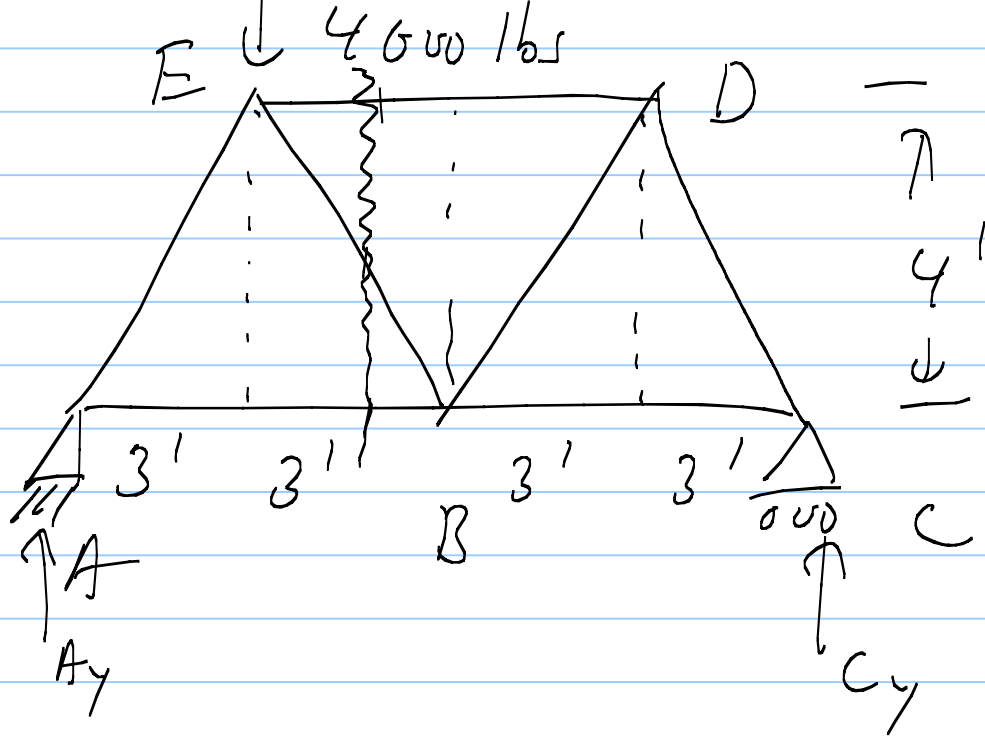
EGR 180 7/1/10

Note Title 7/1/2010

Method of Sections



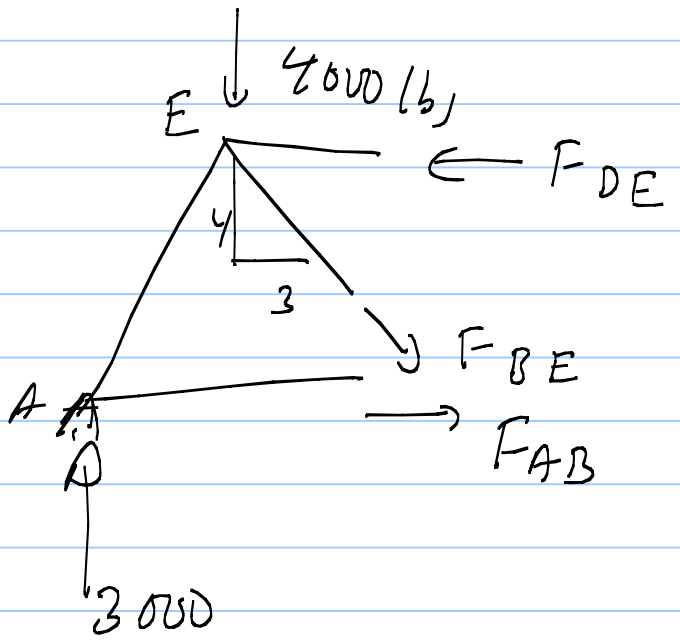
F_{DE}, F_{BE}, F_{AB}

4'

$\sum M_A = -3 \cdot 4000 + 12 \cdot C_y = 0$

$C_y = 1000$ lbs

$\sum F_y \rightarrow A_y = 3000$ lbs



$$\sum m_E = 4F_{AB} - 3 \cdot 3000 = 0$$

$$F_{AB} = 2250 \text{ lb}$$

$$\sum m_B = 4F_{DE} + 3(4000) - 6 \cdot 3000 = 0$$

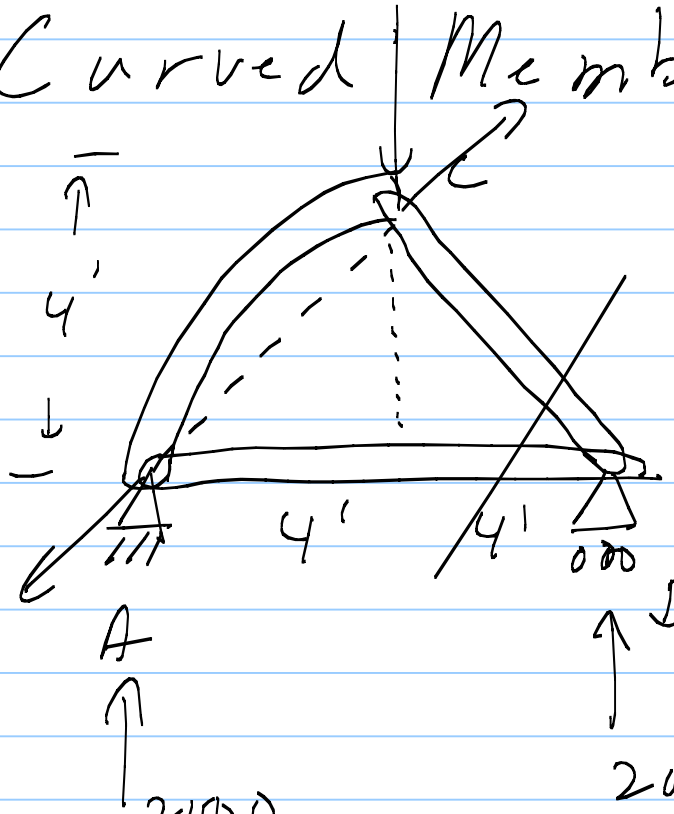
$$F_{DE} = 1500 \text{ lb}$$

$$\sum F_y = 3000 - 4000 - .8F_{BE} = 0$$

$$.8F_{BE} = -1000 \Rightarrow F_{BE} = -1250 \text{ lb}$$

F = 4000 lbs

Curved Members

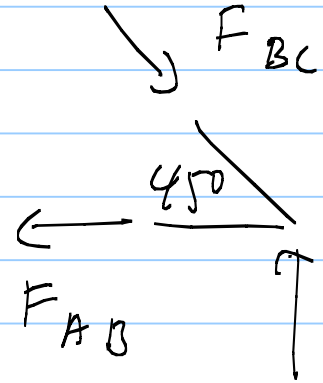


2000

$F_{AC} = 2000\sqrt{2}$ lbs

2000

2000

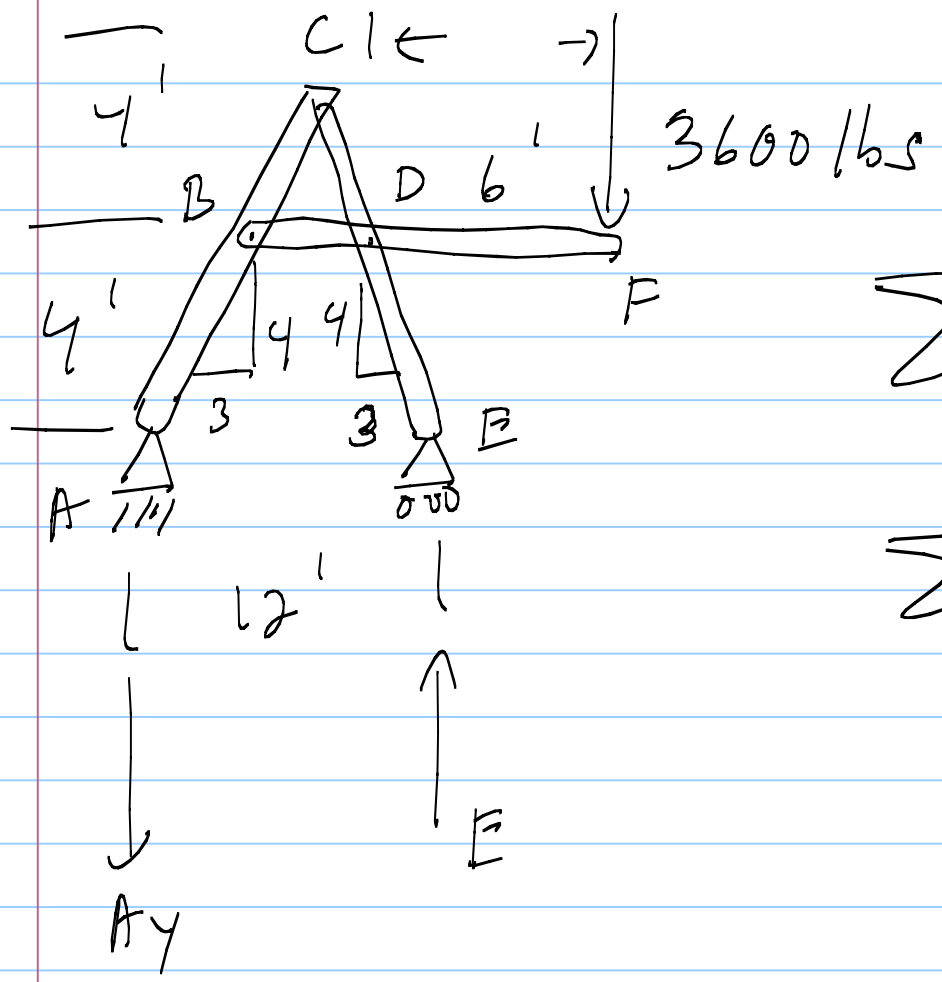


$\sum F_y = 2000 - F_{BC} \sin 45 = 0$

$F_{BC} = 2000\sqrt{2}$ lbs

$\sum F_x = -F_{AB} + F_{BC} \cos 45 =$

$\Rightarrow F_{AB} = 2000$ lbs

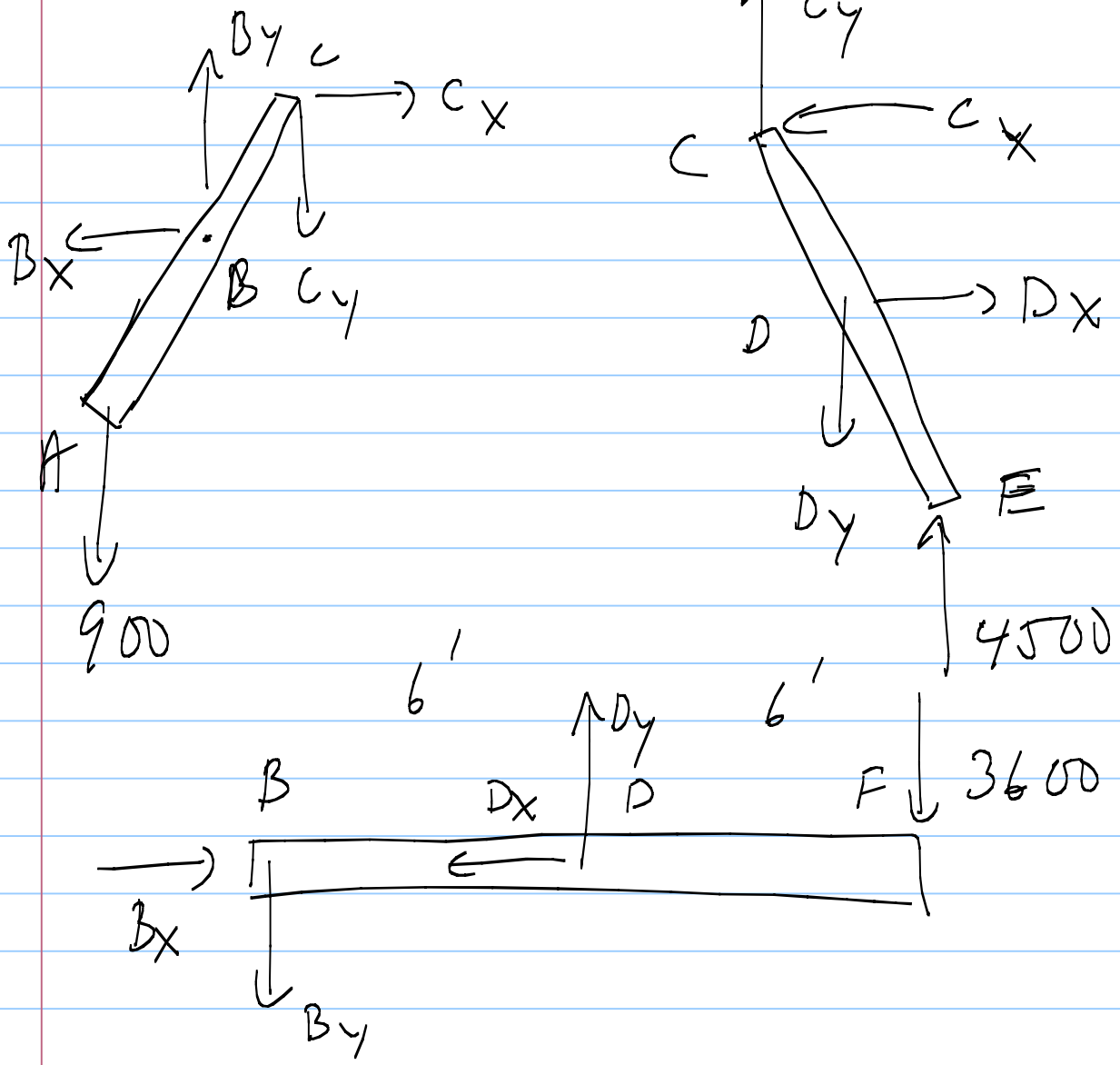


$$\sum M_A = 12E - 15 \cdot 3600 = 0$$

$$E = 4500 \text{ lbs}$$

$$\sum F_y = -A_y + 4500 - 3600 = 0$$

$$A_y = 900 \text{ lbs}$$


By
C
Cx
Bx
B
Cy
A
900
Cy
Cx
C
D
Dx
Dy
E
4500
6'
6'
Dy
B
Dx
D
F
3600
Bx
By

$$\sum M_B = 6D_y - 12 \cdot 3600 = 0$$

$$D_y = 7200 \text{ lbs}$$

$$\sum F_y = -B_y + 7200 - 3600 = 0$$

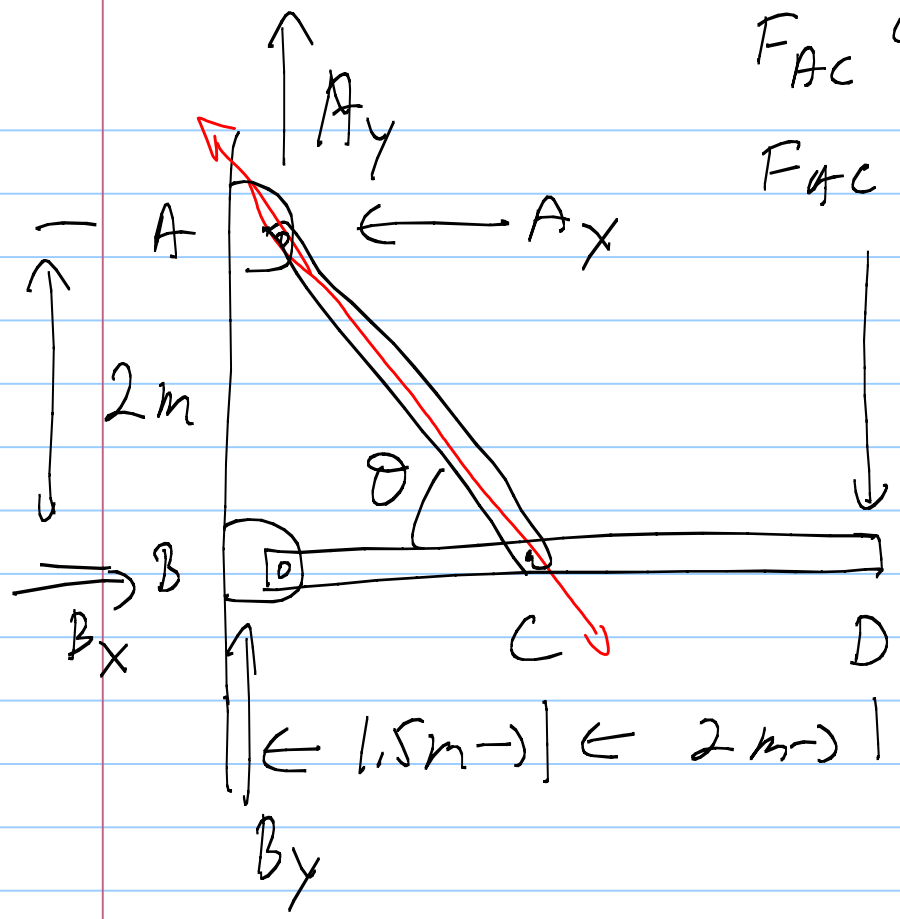
$$B_y = 3600 \text{ lbs}$$

On bar ABC $\sum M_C = -3(3600) + 6(900)$

$$\sum F_y = -900 + 3600 - C_y = 0 \qquad -4B_x = 0$$

$$C_y = 2700 \text{ lbs} \qquad B_x = -1350 \text{ lbs}$$

$$C_x = -1350 \text{ lbs} \qquad D_x = -1350 \text{ lbs}$$



$F_{AC}\cos\theta = A_x$

$F_{AC}\sin\theta = A_y$

$\frac{A_x}{A_y} = \cot(\theta)$

$\sum M_B = 2A_x - 3.5 \cdot 4500 = 0$

$A_x = 7875\ N$

$\sum F_x = -A_x + B_x = 0$

$B_x = A_x = 7875\ N$

$A_y = A_x \tan(\theta) = (7875)\left(\frac{2}{1.5}\right) = 10{,}500\ N$

$$\sum F_y = 1{,}250\sin 45° + B_y = 0$$

$$B_y = -6000\ \text{lb}$$

$$\sum F_x = C_x - 2825 = 0$$

$$C_x = 2825$$

$$\sum F_y = C_y - 1{,}250\cos 45° - 6000 = 0$$

$$C_y = 7{,}084.25$$

$$\frac{C_y}{C_x} = \frac{7}{3}$$