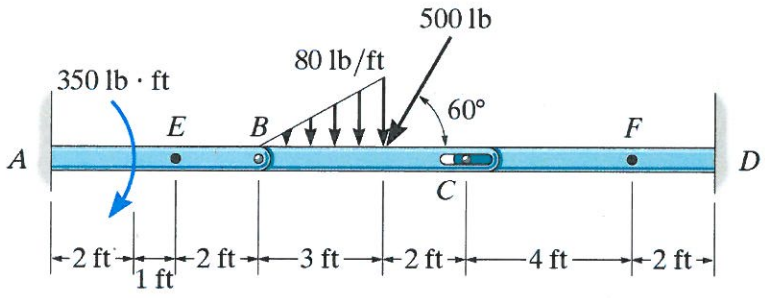
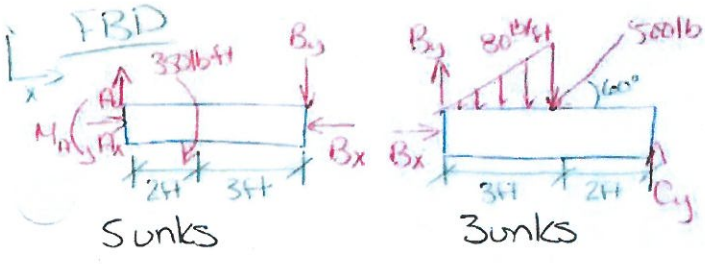
Problem 3 – Internal Forces II

Determine the normal force, shear force, and moment at sections passing through points E and F. Member BC is pinned at B and there is a smooth slot in it at C. The pin at C is fixed to member CD.





Using BC

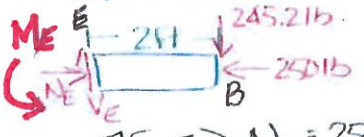
$\curvearrowleft \sum M_B = 0 = -(\frac{1}{2}\cdot 3\cdot 80)(2) - (500\sin 60)(3) + 5C_y$

$C_y = 307.8\text{ lb} \uparrow$ on BC

$\uparrow \sum F_y = 0 = B_y - (\frac{1}{2}\cdot 3\cdot 80) - (500\sin 60) + C_y \Rightarrow B_y = 245.2\text{ lb} \uparrow$ on BC

$\rightarrow \sum F_x = 0 = B_x - (500\cos 60) \Rightarrow B_x = 250\text{ lb} \rightarrow$ on BC

Cut ABCE FBD EB



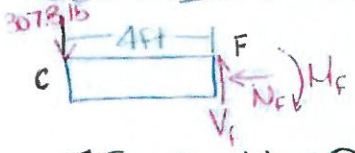
$\sum F_x \Rightarrow N_E = 250\text{ lb} \rightarrow$ on EB

$\sum F_y \Rightarrow V_E = 245.2\text{ lb} \uparrow$ on EB

$\curvearrowleft \sum M_E = 0 = (245.2)(2) - M_E$

$M_E = 490\text{ lb ft} \curvearrowleft$ on EB

Cut CDEF FBD CE



$\sum F_x \Rightarrow N_F = 0$

$\sum F_y \Rightarrow V_F = 307.8\text{ lb} \uparrow$ on CF

$\curvearrowleft \sum M_F = 0 = M_F - 4(307.8)$

$M_F = 1231\text{ lb ft} \curvearrowright$ on CF