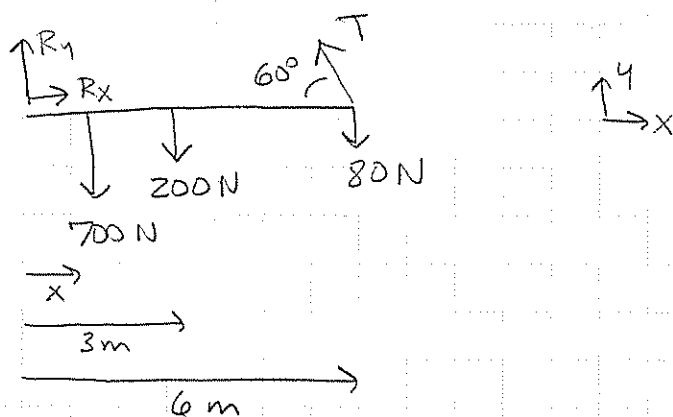


3. Ch. 12 problem 37

a) FBD of beam:



b) with $x = 1.00 \text{ m}$, want to find T , R_x , + R_y

$$\sum F_x = R_x - T \cos 60 = 0 \Rightarrow R_x = T \cos 60^\circ$$

$$\sum F_y = R_y + T \sin 60 - 980 \Rightarrow R_y = 980 - T \sin 60$$

take torques about end at wall to eliminate R_x + R_y :

$$\sum \tau_L = -(1 \text{ m})(700 \text{ N}) - (3 \text{ m})(200 \text{ N}) + (6 \text{ m})T \sin 60 - (6 \text{ m})(80 \text{ N}) = 0$$

$$\text{solve for } T: T = \frac{700 + 600 + 480 \text{ N}\cdot\text{m}}{(6 \text{ m}) \sin 60} = 343 \text{ N}$$

$$\text{then } R_x = T \cos 60 = 171 \text{ N} \rightarrow$$

$$R_y = 980 - T \sin 60 = 683 \text{ N} \uparrow$$

c) Find x so that $T = 900 \text{ N}$: use torque about left end

$$-700x - (2)(300) - (6)(80) + (6)(900) \sin 60 = 0$$

$$x = 5.14 \text{ m}$$