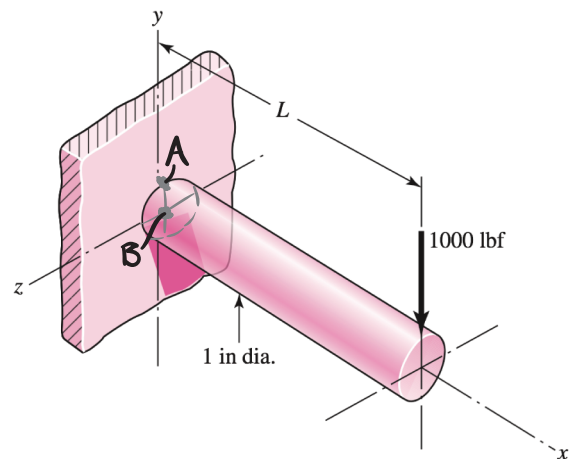


Beam bending stress

004 | 1/

Locate the maximum normal + shear stress points + calculate the stresses at each of them. Let $L = 10$ in.

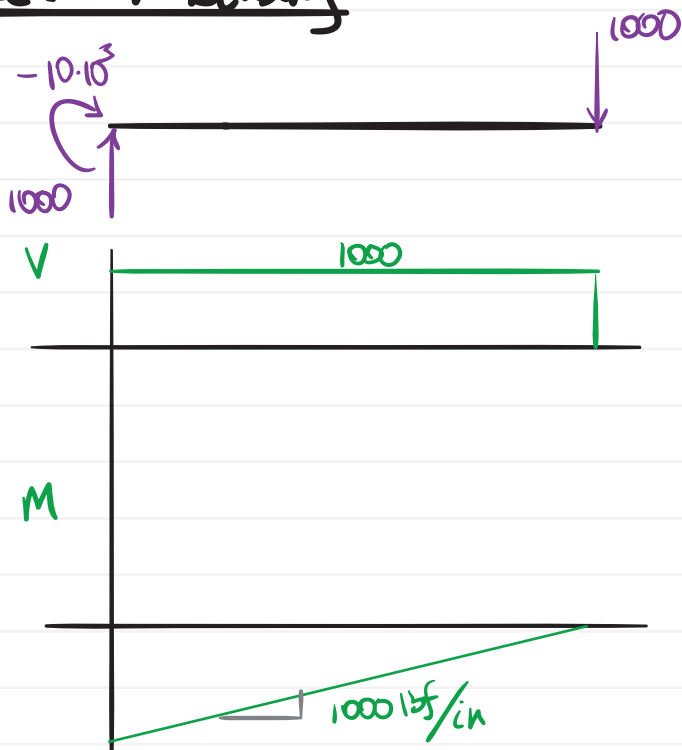
FBD



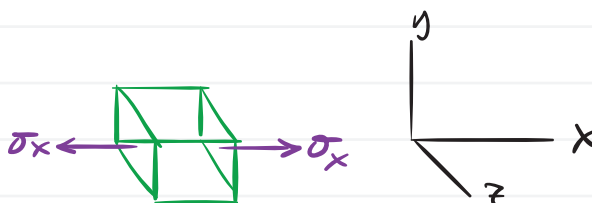
Reactions

$$R_x = 0 \quad R_y = 1000 \text{ lbf} \quad M_R = -(1000)(10) = -10 \cdot 10^3 \text{ in} \cdot \text{lbf}$$

Shear + Bending



Stress @ A



$$\sigma_{1,2} = \sigma_x, 0 \quad (\text{from 3-13})$$

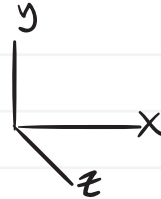
2/

$$\tau_{1,2} = \pm \frac{\sigma_x}{2}$$

$$\sigma_x = -\frac{M_y}{I} = -\frac{(-10 \cdot 10^3)(1/2)}{\pi d^4 / 64} = 101.9 \text{ Ksi} = \sigma_{\max}$$

$$\tau_{1,2} = \pm 50.93 \text{ Ksi}$$

Stress @ B



$$\tau_{\max} = \frac{4V}{3A} = \frac{4 \cdot 1000}{3 \cdot \frac{\pi}{4} d^2} = 1698 \text{ psi}$$