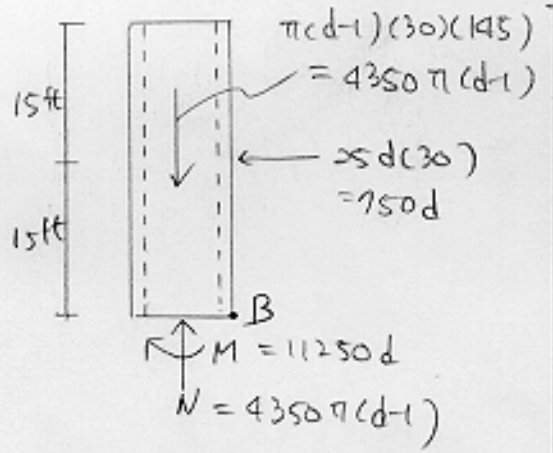
8-32



$\pi(d-1)(30)(145) = 4350\pi(d-1)$

$\sigma d(30) = 750d$

· Section

$$A = \frac{\pi}{4}\left[d^2-(d-2)^2\right] = \pi(d-1)$$

$$I = \frac{\pi}{64}\left[d^4-(d-2)^4\right] = \frac{\pi}{8}(d^3-3d^2+4d-2)$$

· Normal stress ; $\sigma_B = 0$

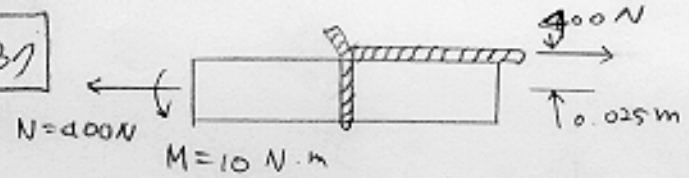
$$\sigma_B = \frac{N}{A} + \frac{M\cdot c}{I} = 0$$

$$\frac{-4350\pi(d-1)}{\pi(d-1)} + \frac{11250d\left(\frac{d}{2}\right)}{\frac{\pi}{8}(d^3-3d^2+4d-2)} = 0$$

$$4350\pi d^3 - 85997.98d^2 + 17400\pi d - 8700\pi = 0$$

$$d = 5.65 \text{ ft}$$

8-37



· Section

$$A = \frac{\pi}{4}(0.05)^2 = 0.625\pi(10^{-3})\ m^2$$

$$I = \frac{\pi}{4}(0.025)^4 = 97.65625\pi(10^{-9})\ m^4$$

· Normal stress

$$\sigma_A = \frac{N}{A} + \frac{M\cdot c}{I}$$

$$= \frac{400}{0.625\pi(10^{-3})} + 0$$

$$= 204\ kpa\ (T)$$

$$\sigma_B = \frac{N}{A} - \frac{Mc}{I}$$

$$= \frac{400}{0.625\pi(10^{-3})} - \frac{10(0.021)}{97.65625\pi(10^{-9})}$$

$$= -611 kpa\ (C)$$