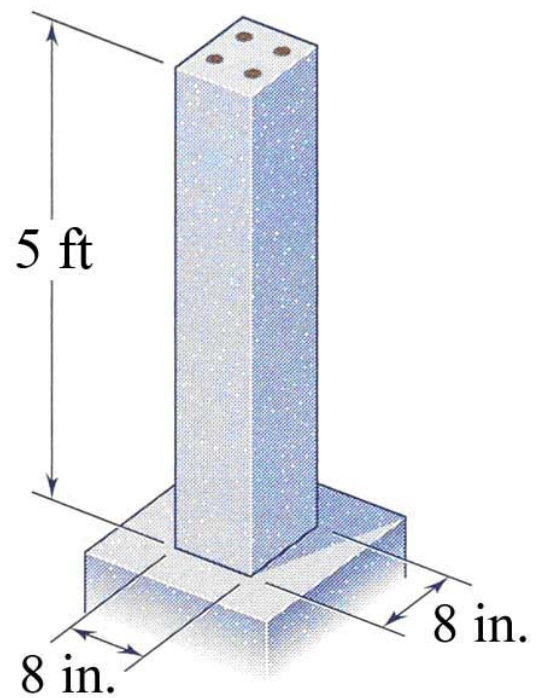


## MEEG 3013 Quiz #2

A 5-ft concrete post is reinforced by four 0.75-in.-diameter steel bars, where  $E_s = 29 \times 10^6$  psi,  $\alpha_s = 6.5 \times 10^{-6}/^\circ\text{F}$ , and  $E_c = 3.6 \times 10^6$  psi,  $\alpha_c = 5.5 \times 10^{-6}/^\circ\text{F}$ . If temperature rises  $90^\circ\text{F}$ , determine (a) the normal stresses  $\sigma_s$  and  $\sigma_c$  induced in the steel and in the concrete, respectively, (b) the change in length  $\delta_{\text{post}}$  of the post.



$$\delta_{\text{post}} = \delta_{sT} - \delta_{sP} = \delta_{cT} + \delta_{cP} \quad \textcircled{2}$$

$$P_s = P_c = P = 3753.63 \text{ lb} \quad \textcircled{2}$$

(a)  $\sigma_s = -2.12 \text{ ksi}$   $\textcircled{2}$

$\sigma_c = +60.3 \text{ psi}$   $\textcircled{2}$

(b)  $\delta_{\text{post}} = +0.0307 \text{ in.}$   $\textcircled{2}$