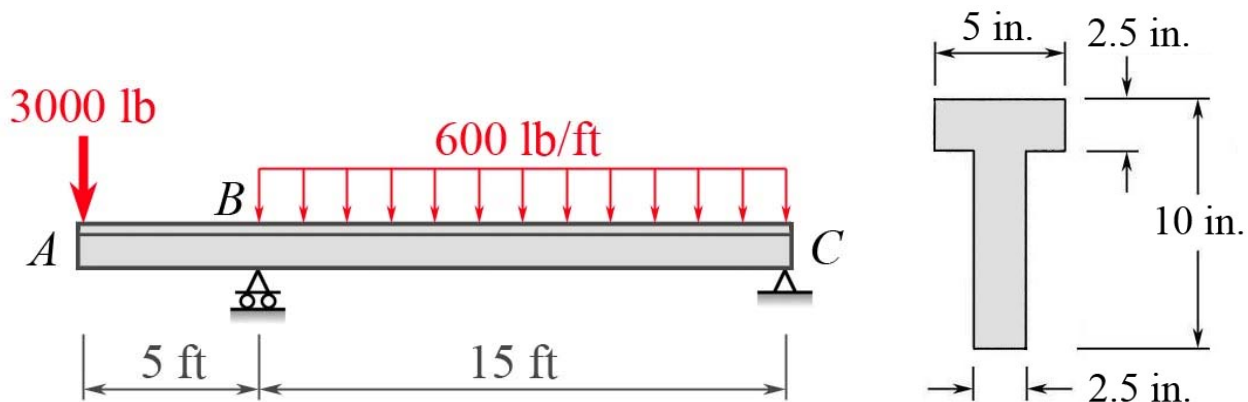


MEEG 4103 Quiz 3.2.091

- ⑩ A plane stress state is listed to have $\sigma_x = 8$ ksi, $\sigma_y = 16$ ksi, and $\tau_{xy} = 3$ ksi (ccw). Drawing a properly labeled Mohr's circle diagram, determine (a) the principal normal stresses σ_1 and σ_2 , (b) the angle ϕ_p from the x axis to σ_1 , (c) sketch showing the principal orientation of the stress element on which σ_1 and σ_2 act.
- ⑩ For the beam shown, determine (a) the maximum tensile bending stress σ_{\max}^+ , (b) the maximum shear stress τ_{\max} due to V .



- $X(8, -3)$ $Y(16, 3)$ ② $\sigma_1 = 17$ ksi $\sigma_2 = 7$ ksi ②
 Properly labeled Mohr's circle ② $\phi_p = 71.6^\circ$ ccw ②
 Sketch showing the principal orientation of the stress element ②
- FBD, shear ($V-x$) and bending-moment ($M-x$) diagrams ③
 $\bar{y} = 5.75$ in. ① $\bar{I} = 281.901$ in⁴ ① Pt. D is 5.83 ft to the left of C.

At B: $\sigma_{\max}^+ = \frac{15000(12)(4.25)}{281.901}$ psi = 2713.7 psi ①
 At D: $\sigma_{\max}^+ = \frac{10208.3(12)(5.75)}{281.901}$ psi = 2498.7 psi ①
 At B: $\tau_{\max} = \frac{VQ}{Ib} = \frac{5500(0.5)(5.75)^2(2.5)}{281.901(2.5)}$ psi = 322.53 psi

$\sigma_{\max}^+ = 2.71$ ksi at B ① $\tau_{\max} = 323$ psi at B ②