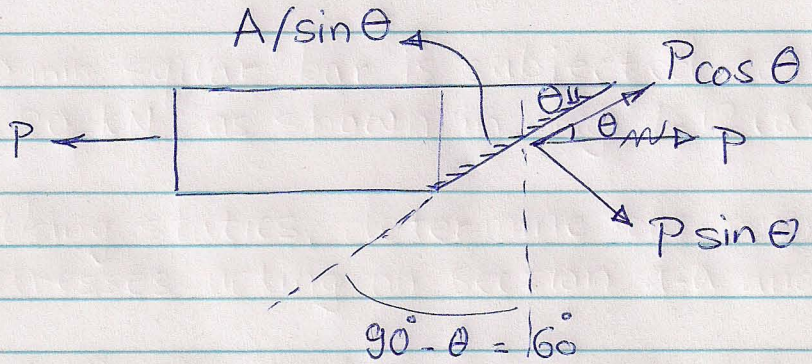
Problem 1-17:/2

section b-b,



$$\sigma = \frac{P\sin\theta}{A/\sin\theta} = \frac{20\times10^3 \times \sin 30^\circ}{100/\sin 30^\circ} = 50\ MPa.$$

$$\tau = \frac{P\cos\theta}{A/\sin\theta} = \frac{20\times10^3 \times \cos 30^\circ}{100/\sin 30^\circ} = 86.6\ MPa.$$

b). By using Eqs. 1-7a and 1-7b.

$$\sigma_{a-a} = \frac{P}{A}\cos^2\theta = \frac{20\times10^3}{100}\cos^2 30^\circ = 150\ MPa.$$

$$\tau_{a-a} = \frac{P}{A}\sin\theta\cos\theta = \frac{20\times10^3}{100}\times\sin 30^\circ\times\cos 30^\circ = 86.6\ MPa$$

$$\sigma_{b-b} = \frac{P}{A}\cos^2\theta = \frac{20\times10^3}{100}\times\cos^2 60 = 50\ MPa$$

$$\tau_{b-b} = \frac{P}{A}\sin\theta\cos\theta = \frac{20\times10^3}{100}\sin 60^\circ\times\cos 60^\circ = 86.6\ MPa$$

c).