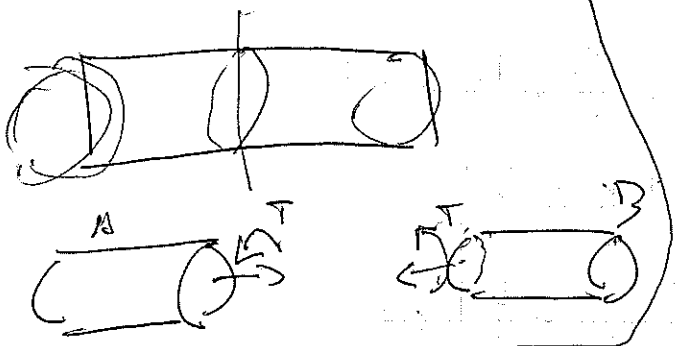
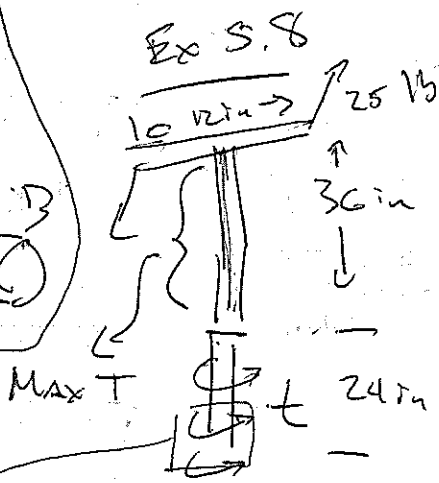


Ex 5.8



$T = 300$ in·lb

$\Sigma M = 0$

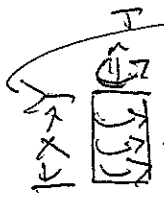
$0 = 300 + t(24)$

$t = -12.5$ in·lb/in

$\tau = \frac{TC}{J} = \frac{300 \text{ in lb}\,(1 \text{ in})}{\pi/2\,(1 \text{ in})^4}$

$\tau_{MAX} = 191$ psi

$\phi = \int_0^2 \frac{T\,dx}{JG} = \frac{1}{JG}\left[\int_0^{24} T_1\,dx + 36\text{ in}\,(300\text{ in lb})\right]$



$\Sigma M = 0$

$T + tx = 0$

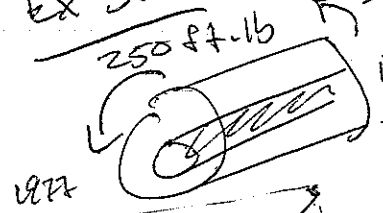
$T = 12.5x$

$\phi = \frac{1}{\pi/2\,(1\text{in})^4\ 5.5 \times 10^6 \text{ lb/in}^2}\left(6.25(24)^2 + 36(300)\right)$

$\phi = .00167$ rad

$= .096°$

Ex 5.10



(1) $T_{ST} + T_{BR} = 250$ ft-lb

(2) $\phi_{ST} = \phi_{BR}$

$G_{ST} = 11.4$ Msi

$G_{BR} = 5.20$ Msi

$J_{ST} = \pi/2\,(1^4 - .5^4)$

$J_{BR} = \pi/2\,(.5^4)$

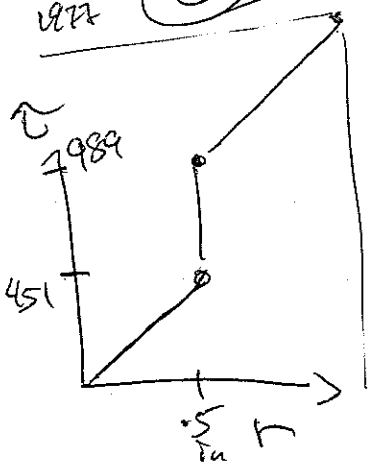
$\frac{T_{ST} K}{J_{ST} G_{ST}} = \frac{T_{BR} K}{J_{BR} G_{BR}}$

$T_{ST} = T_{BR}\left(\frac{J_{ST} G_{ST}}{J_{BR} G_{BR}}\right)$

$= 32.88\, T_{BR}$

$T_{BR} = 7.38$ ft-lb

$T_{ST} = 242.6$ ft-lb

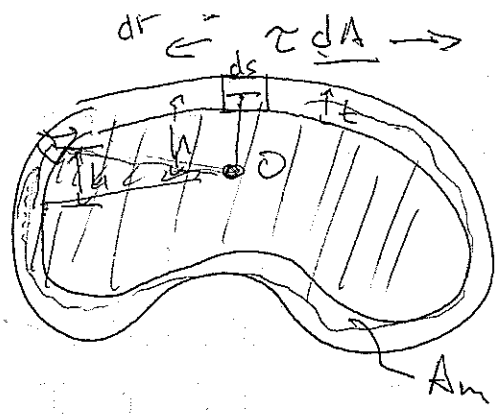


$\tau = \frac{Tc}{J}$

$\tau_{BR}^{MAX} = 451$ psi

$\tau_{ST}^{MAX} = 1977$ psi

$\tau_{ST}^{MIN} = 989$ psi



$$T = \oint h \tau_{AVG} t \, ds$$

$$= q \oint h \, ds$$

$$dA_m = \frac{1}{2} h \, ds$$

$$T = 2 q A_m$$