

Prob. 1.

(a)

$$S_a = \frac{S_{ut} - F_i/A_t}{1 + S_{ut}/S_e}$$

$$A_t = 0.0775 \text{ in}^2$$

$$F_i = 0.75 S_p A_t$$

$$= 0.75 \times 85 \times 0.0775$$

$$= 4.94 \text{ kp}$$

$$S_{ut} = 120 \text{ kpsi}$$

$$S_e = 18.6 \text{ kpsi}$$

$$\Rightarrow S_a = 7.55 \text{ kpsi}$$

$$P_{max} = \frac{\text{Pressure} \times \text{Area}}{6}$$

$$= \frac{(2000) \times \frac{4^2 \pi}{4}}{6}$$

$$= 4.188 \text{ kp}$$

$$\Rightarrow \sigma_a = \frac{c P_{max}}{2 A_t} = \frac{0.1 \times 4.188}{2 \times 0.0775} = 2.7 \text{ kpsi}$$

$$S.F. = \frac{S_a}{\sigma_a} = \frac{7.55 \text{ kpsi}}{2.702 \text{ kpsi}} = 2.79$$

(b) joint separation:

$$F_i = p(1-c)$$

$$F_i = 0.75 S_p A_t, c = 0.1$$

$$\Rightarrow p = \frac{0.75 S_p A_t}{1-c}$$

$$= \frac{0.75 \times 85 \times 0.0775}{1-0.1}$$

$$= 5490 \text{ kp}$$

6 bolts \Rightarrow separation pressure

$$= \frac{6P}{(\frac{\pi}{4} D^2)} = 2621 \text{ psi}$$

Solution 1 of 2