

Stress Concentrations

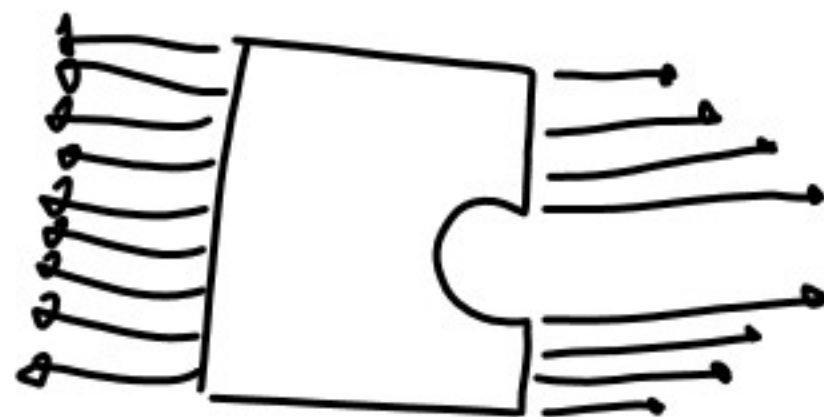
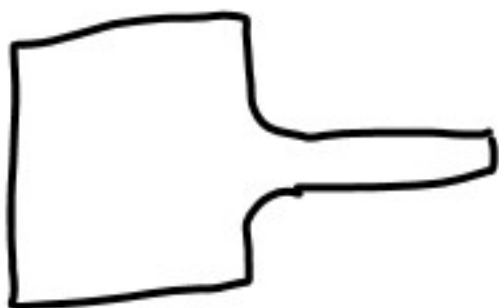


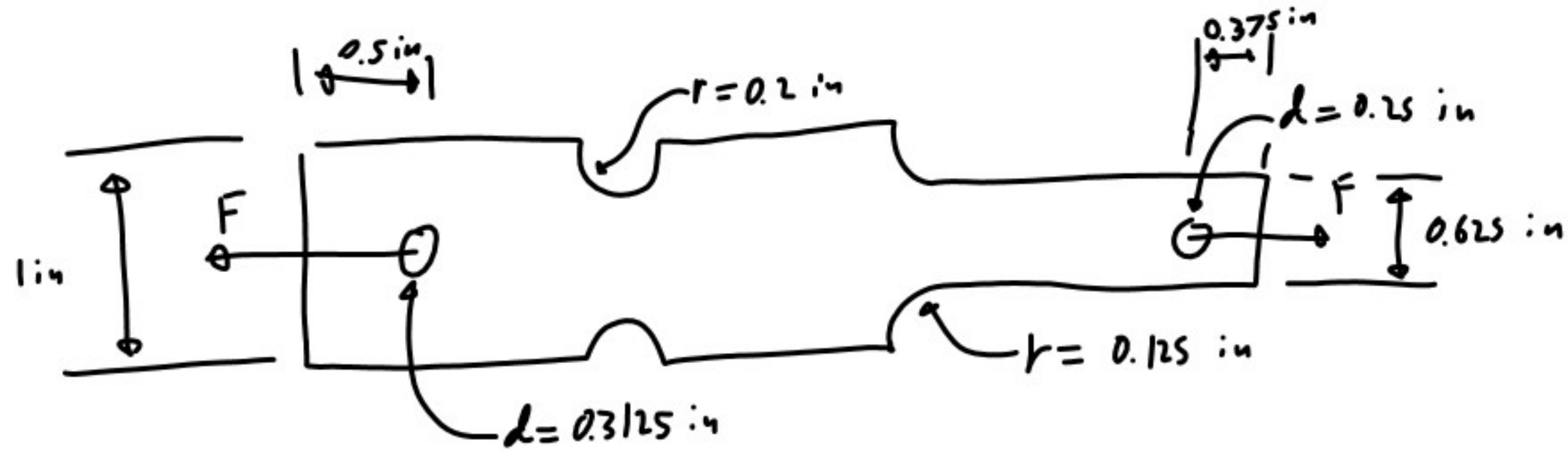
$$K_t = \frac{\sigma_{max}}{\sigma_0}$$

$$K_{ts} = \frac{\tau_{max}}{\tau_0}$$

$$K_t \sigma_0 = \sigma_{max}$$

Only used for brittle materials





$$F = 100 \text{ lbs}$$

$$t = 0.1875 \text{ in}$$

A-15-3

$$d = 1 - 0.2 - 0.2 = 0.6 \text{ in}$$

$$A = dt = 0.1125 \text{ in}^2$$

$$\sigma_0 = \frac{F}{A} = 889 \text{ psi}$$

$$\frac{r}{d} = \frac{0.2}{0.6} = \frac{1}{3}$$

$$\frac{w}{d} = \frac{1}{0.6} = 1.67$$

$$K_t = 1.75$$

$$\sigma_{\max} = 889 \cdot 1.75 = 1556 \text{ psi}$$

A-15-5

$$D = 1 \text{ in}$$

$$d = 0.25 \text{ in}$$

$$\frac{D}{d} = 1.6$$

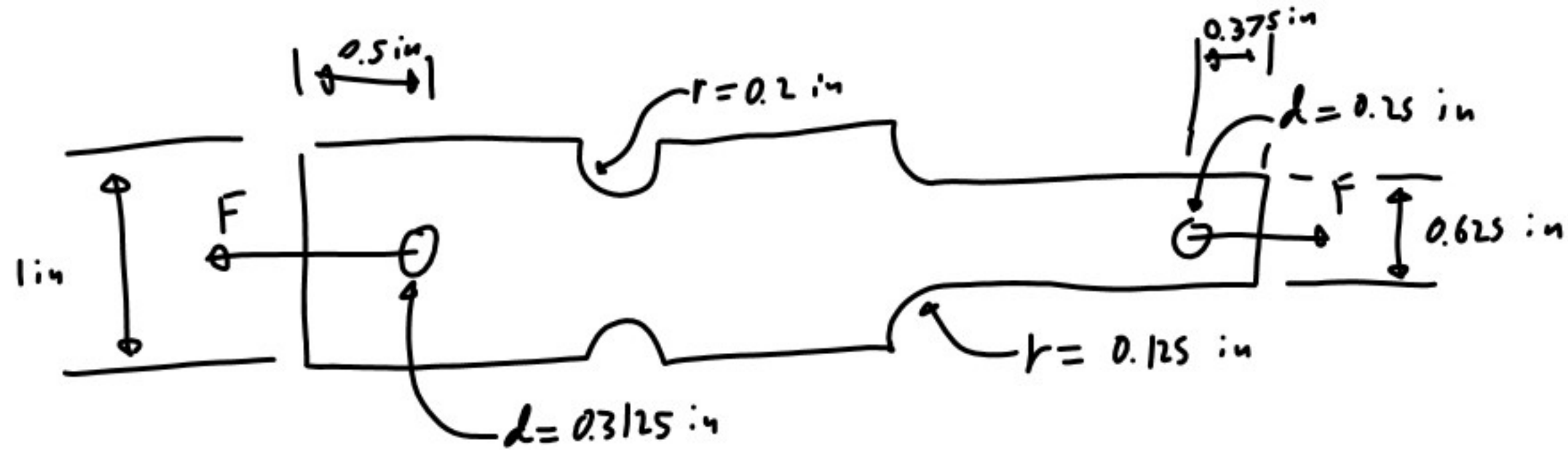
$$\sigma_0 = \frac{100}{0.625 \cdot 0.1875} = 853 \text{ psi}$$

$$\sigma_{\max} = 1.8 \cdot 853 = 1536 \text{ psi}$$

$$r = 0.125$$

$$\frac{r}{d} = 0.2$$

$$K_t = 1.8$$



$$F = 100 \text{ lbs}$$

$$t = 0.1875 \text{ in}$$

A-15-12

$$w = 1 \text{ in} \quad h = 0.5 \text{ in} \quad d = 0.3125 \text{ in}$$

$$\frac{h}{w} = \frac{0.5}{1} = 0.5 \quad \frac{d}{w} = \frac{0.3125}{1} = 0.3125$$

$$K_t = 4 \quad A = (1 - 0.3125) 0.1875 = 0.1289$$

$$\sigma_0 = \frac{F}{A} = 776 \text{ psi} \quad \sigma_{\max} = \sigma_0 K_t = 3103 \text{ psi}$$

$$w = 0.625 \text{ in}$$

$$h = 0.375 \text{ in}$$

$$\frac{h}{w} = \frac{0.375}{0.625} = 0.6$$

$$d = 0.25 \text{ in}$$

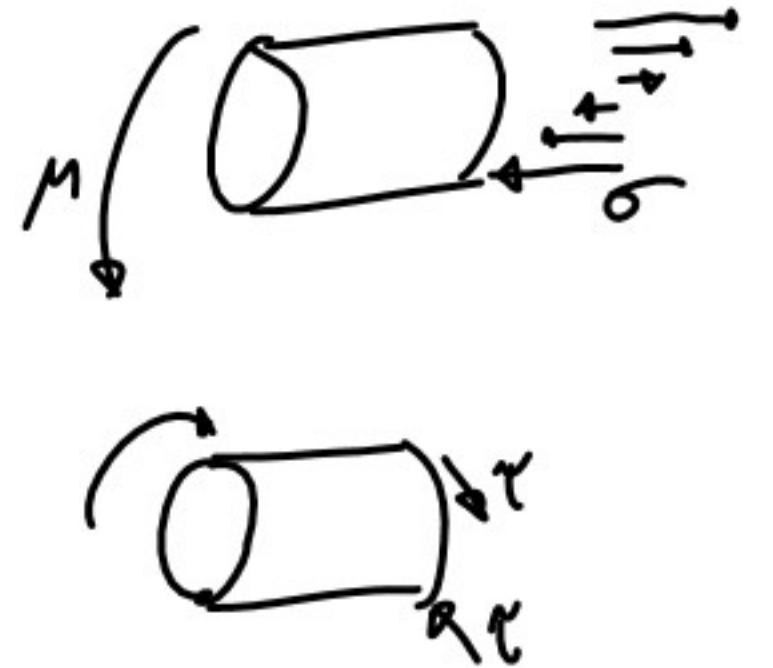
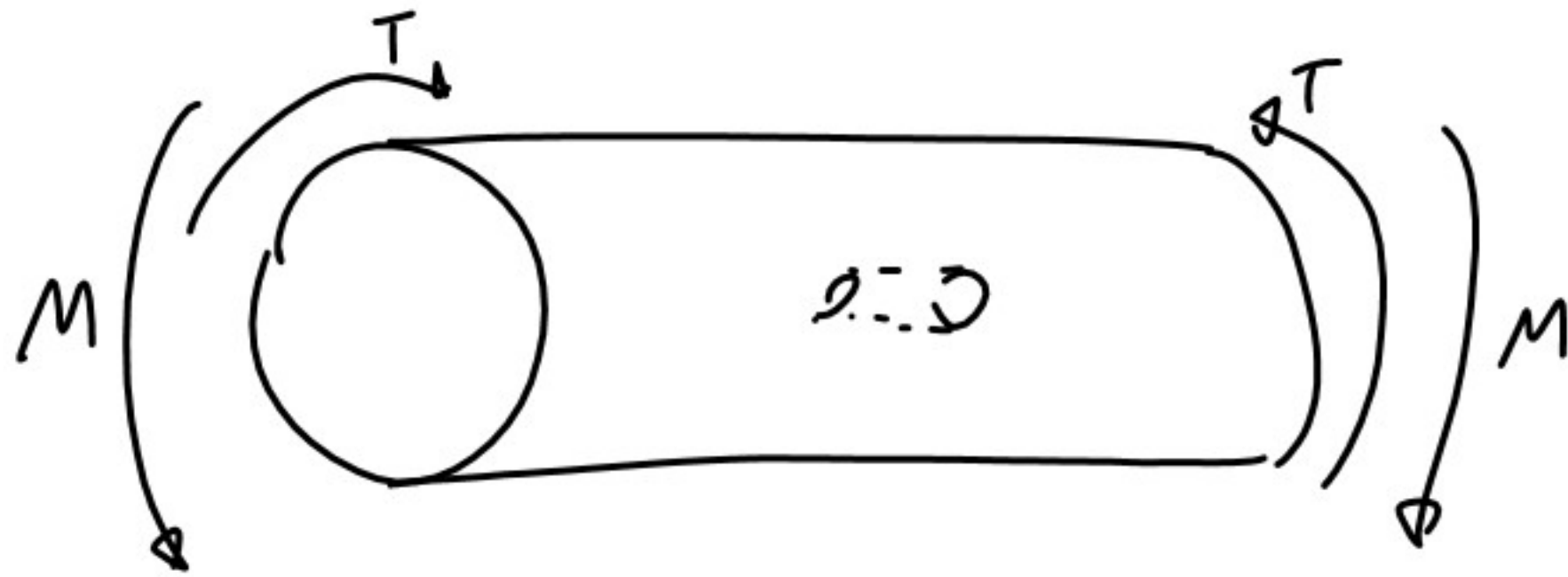
$$\frac{d}{w} = \frac{0.25}{0.625} = 0.4$$

$$K_t = 3$$

$$A = (0.625 - 0.25) 0.1875 = 0.0703$$

$$\sigma_0 = \frac{F}{A} = 1422 \text{ psi}$$

$$\sigma_{\max} = \sigma_0 K_t = 4267 \text{ psi}$$



Use Mohr's Circle