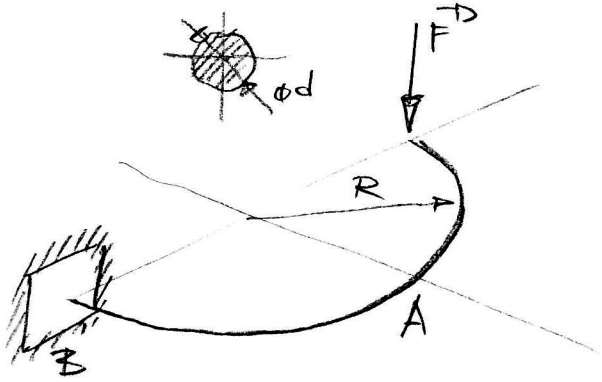
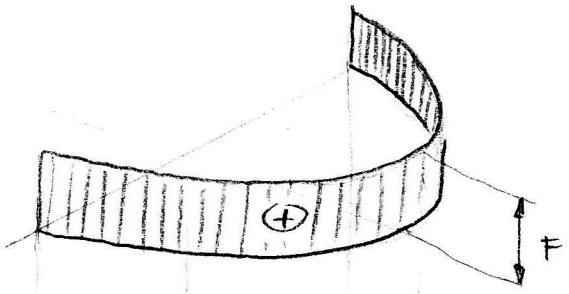
Př: Stanovte bezpečnost vzhledem k MS pružnosti.



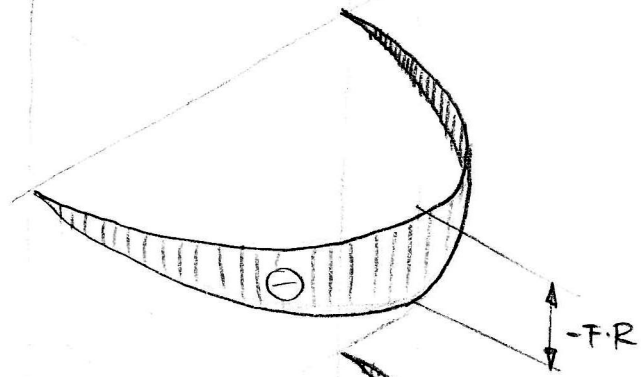
Dáno: F, d, R, σ_k

Určete: k

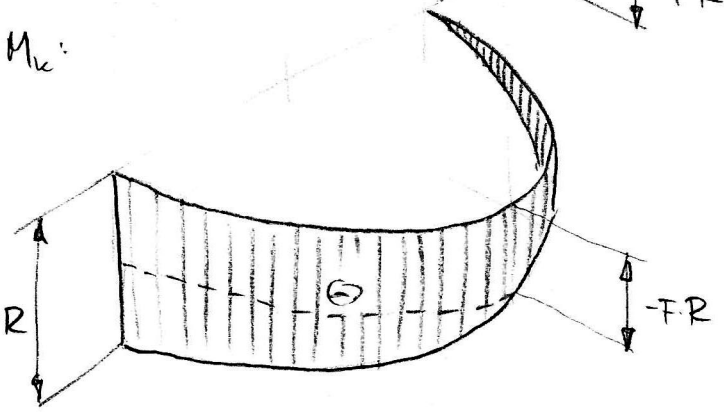
T:



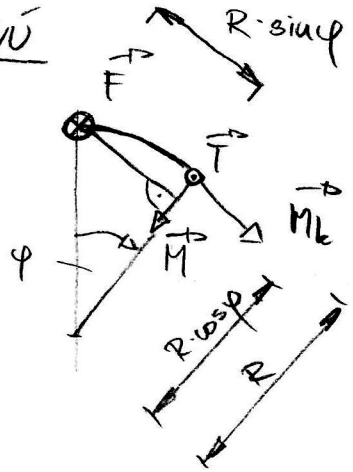
M:



M_k:



1. VVÚ



$\varphi \in (0, \pi)$

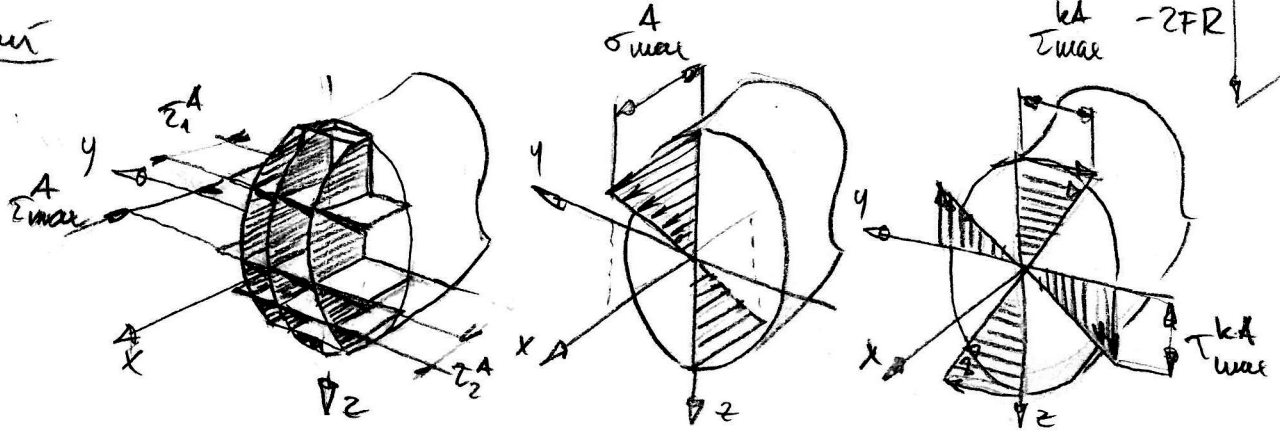
$T = F$

$M = -F \cdot R \cdot \sin\varphi$

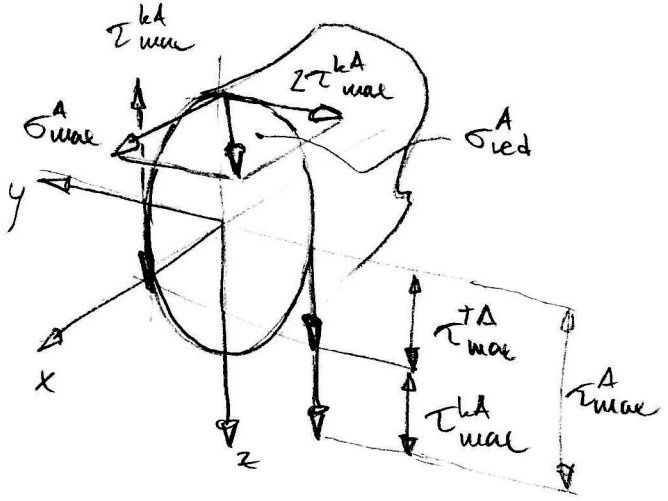
$M_k = -F \cdot R\,(1 - \cos\varphi)$

2. Řešení

(A)



$$\tau_{max}^{TA} = \frac{4}{3}\frac{T^A}{S} = \frac{4}{3}\frac{F}{\frac{\pi \cdot d^2}{4}} = \frac{16F}{3\pi d^2} \quad , \quad \sigma_{max}^{A} = \frac{M^A}{W_o} = \frac{F \cdot R}{\frac{\pi \cdot d^3}{32}} = \frac{32F \cdot R}{\pi \cdot d^3} \quad , \quad \tau_{max}^{kA} = \frac{M_k^A}{W_k} = \frac{F \cdot R}{\frac{\pi d^3}{16}} = \frac{16F \cdot R}{\pi d^3}$$



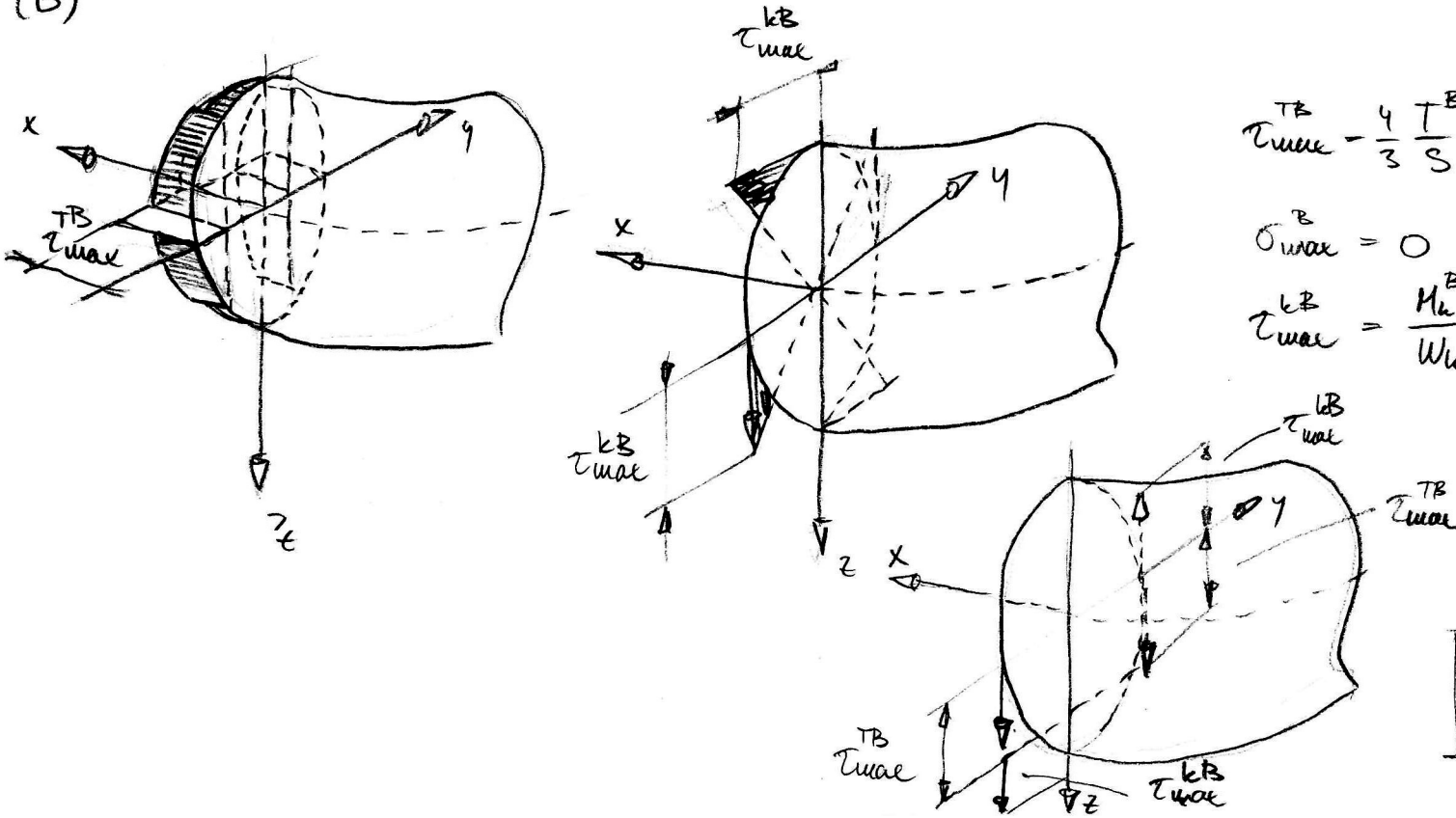
$$\sigma_{red}^{A} = \sqrt{(\sigma_{max}^{A})^2 + 3(\tau_{max}^{kA})^2} = \dots$$

$$\sigma_{red}^{A} = \sqrt{(\sigma_{max}^{A})^2 + 4(\tau_{max}^{kA})^2} = \dots$$

$$\tau_{max}^{A} = \tau_{max}^{TA} + \tau_{max}^{kA} = \dots$$

$$k^A = \min\left\{ \frac{\sigma_k}{\sigma_{red}^{A}} \; ; \; \frac{\sigma_k}{2\tau_{max}^{A}} \right\}$$

(B)



$$\tau_{max}^{TB} = \frac{4}{3}\frac{T^B}{S} = \frac{4}{3}\frac{F}{\frac{\pi d^2}{4}} = \frac{16F}{3\pi d^2}$$

$$\sigma_{max}^{B} = 0$$

$$\tau_{max}^{kB} = \frac{M_k^B}{W_k} = \frac{2F \cdot R}{\frac{\pi d^3}{16}} = \frac{32F \cdot R}{\pi d^3}$$

$$\tau_{max}^{B} = \tau_{max}^{TB} + \tau_{max}^{kB}$$

$$k^B = \frac{\sigma_k}{2\tau_{max}^{B}}$$