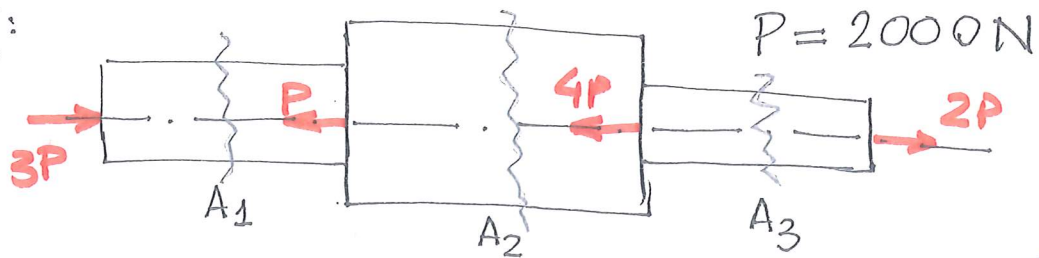


## 2.1.3

GIVET:



$$A_1 = 75 \text{ mm}^2$$

$$A_2 = 100 \text{ mm}^2$$

$$A_3 = 50 \text{ mm}^2$$

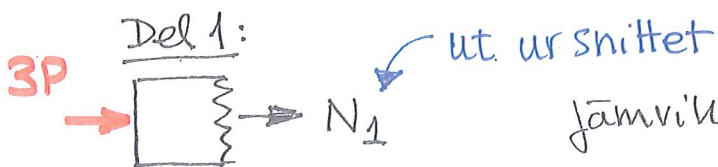
En rak stång som är sammansatt av 3 cylindriska delar

SÖKT: Normalspänningen i varje del.

LÖSNING:

1. Ta fram Normalkrafter
2. Ta fram Normalspänningar

① Snitta stängen:

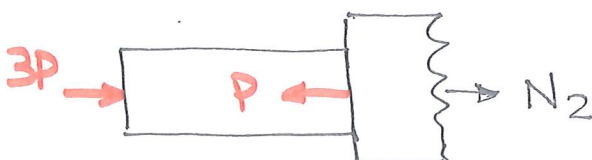


jämvikt:  $\Rightarrow 3P + N_1 = 0$

$$N_1 = -3P$$

$$N_1 = -6000 \text{ N}$$

Del 2:

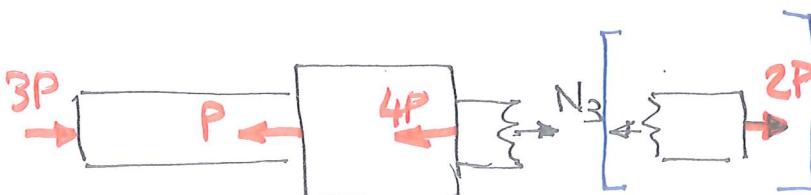


jmv  $\Rightarrow 3P - P + N_2 = 0$

$$N_2 = -2P$$

$$N_2 = -4000 \text{ N}$$

Del 3:



$$3P - P - 4P + N_3 = 0$$

$$N_3 = 2P$$

$$N_3 = 4000 \text{ N}$$

② Definition på spänning.

Del 1:  $\sigma_1 = \frac{N_1}{A_1} = \frac{-6000 \text{ N}}{75 \text{ mm}^2} \cdot \frac{10^6 \text{ mm}^2}{1 \text{ m}^2} = -80 \cdot 10^6 \text{ Pa}$

$$\boxed{\sigma_1 = -80 \text{ MPa}}$$

Del 2:  $\sigma_2 = \frac{N_2}{A_2} = \frac{-4000 \text{ N}}{100 \text{ mm}^2} = -40 \text{ MPa}$

Del 3:  $\sigma_3 = \frac{N_3}{A_3} = \frac{4000 \text{ N}}{50 \text{ mm}^2} = 80 \text{ MPa}$

Normalkrafter

$$N_1 = -6000 \text{ N}$$

$$N_2 = -4000 \text{ N}$$

$$N_3 = 4000 \text{ N}$$

Normalspänningar

$$\sigma_1 = -80 \text{ MPa}$$

$$\sigma_2 = -40 \text{ MPa}$$

$$\sigma_3 = 80 \text{ MPa}$$

$$\frac{\text{N}}{\text{m}^2} = \text{Pa} \quad ; \quad \frac{\text{N}}{\text{mm}^2} = \text{MPa} \quad ;$$