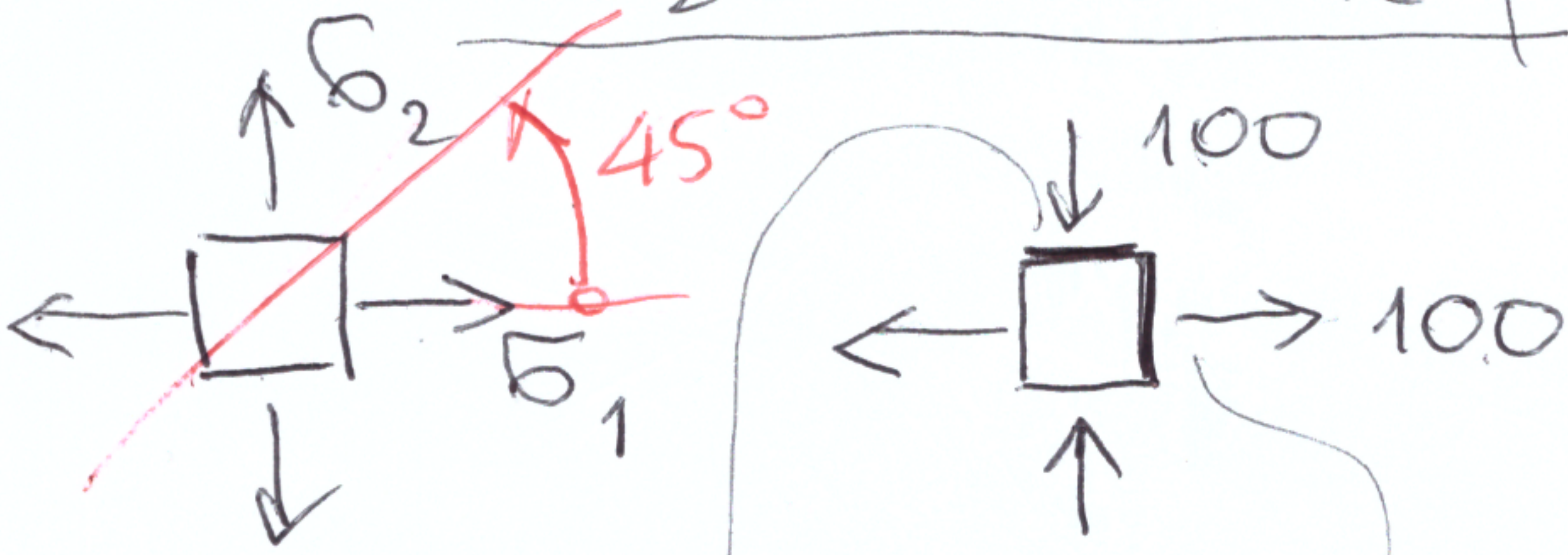


Z1

$$\sigma_1 = 100 \text{ MPa}$$

$$\sigma_2 = -100 \text{ MPa}$$

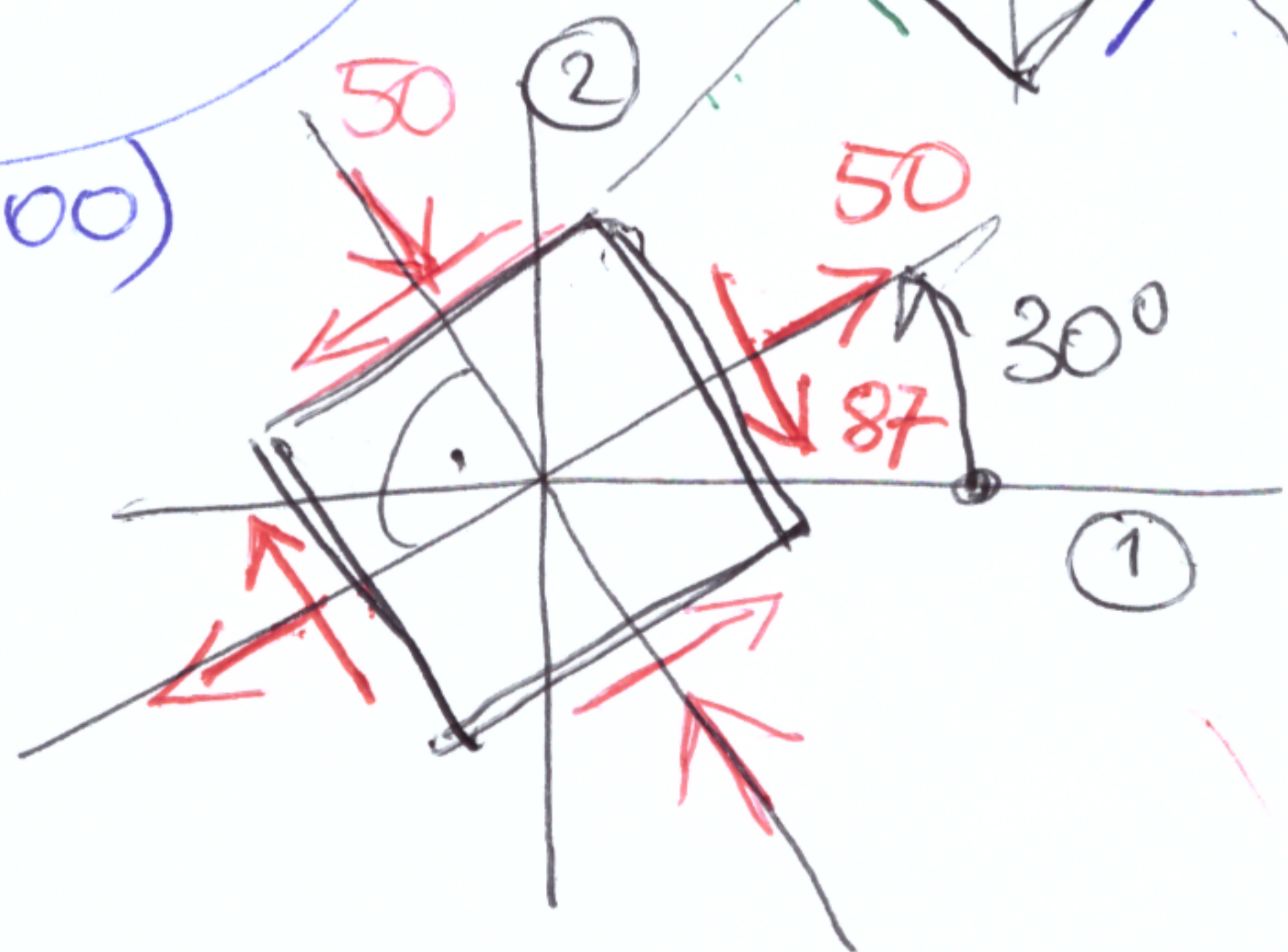
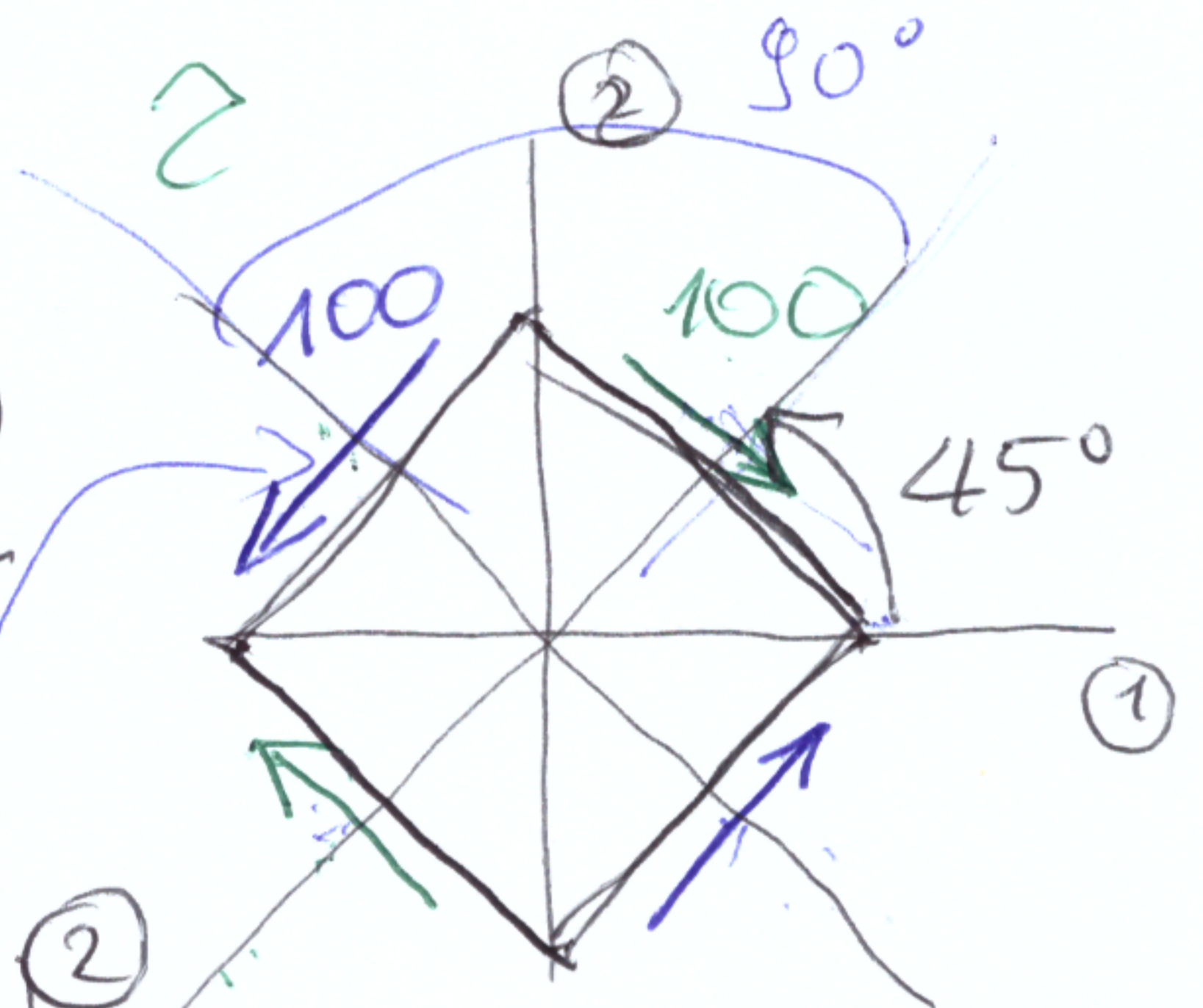
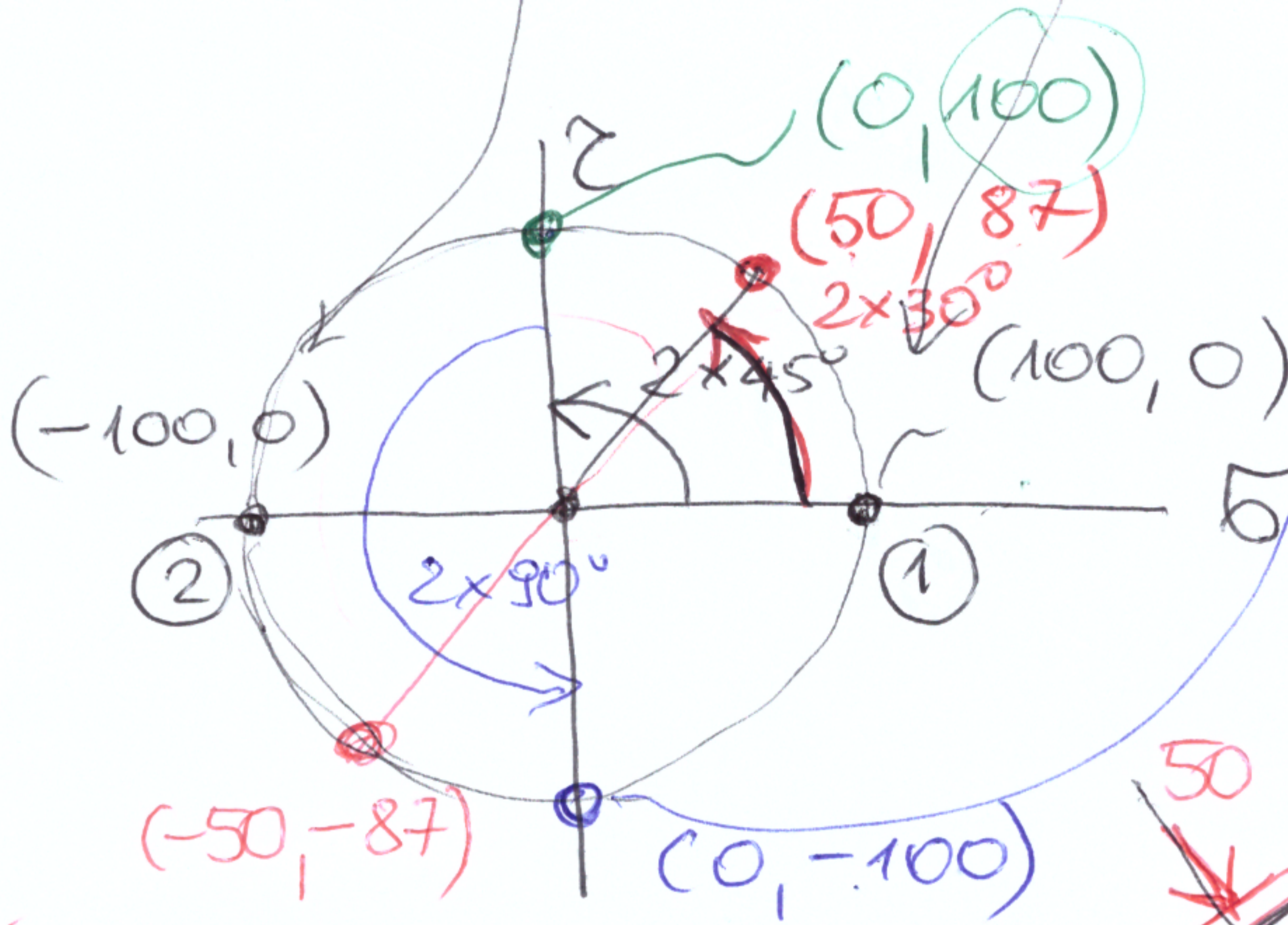
$$1 \text{ MPa} = 1 \frac{\text{N}}{\text{mm}^2}$$



$\tau_{max}$

$$\sigma_{45^\circ}, \tau_{45^\circ}$$

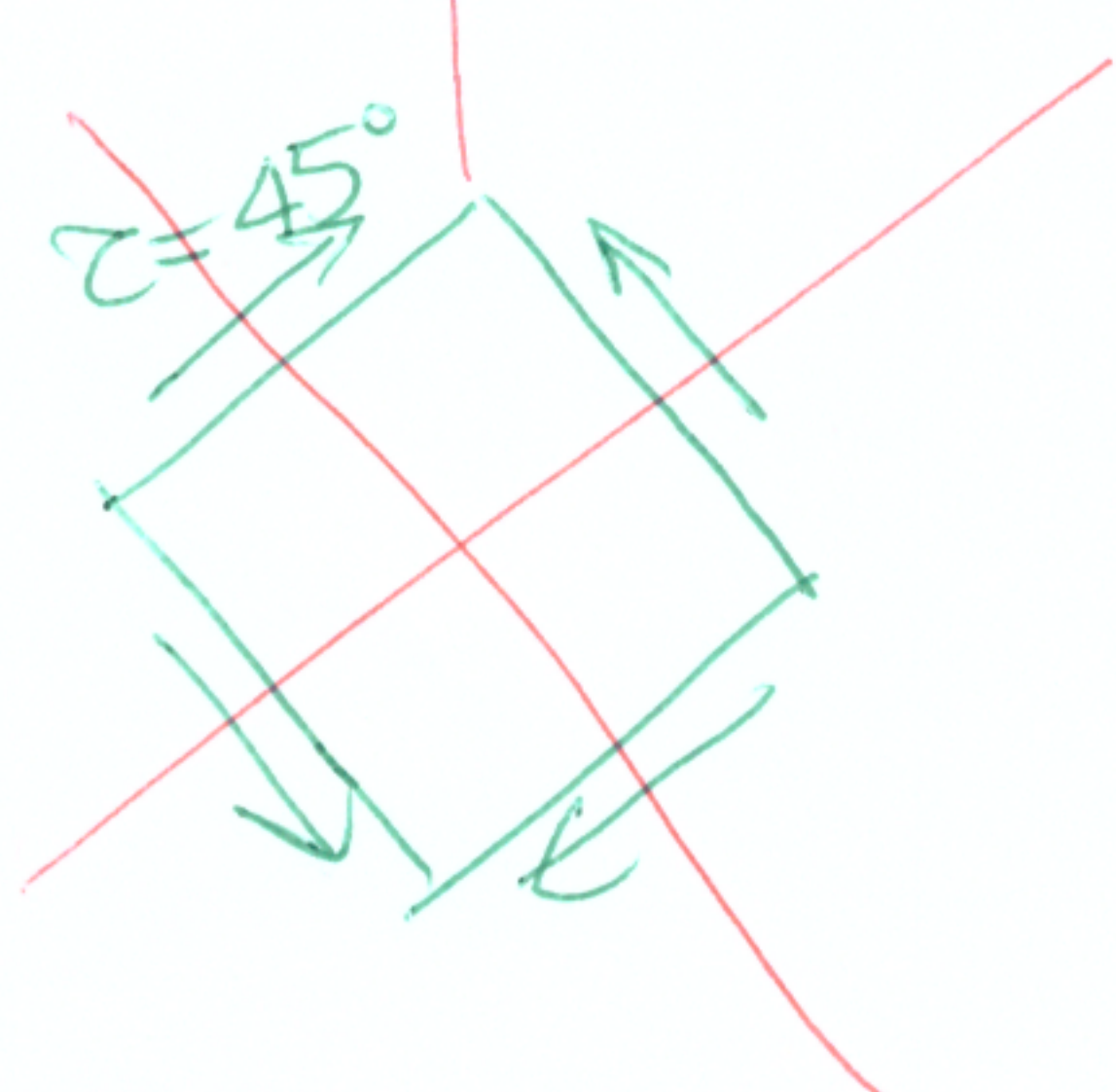
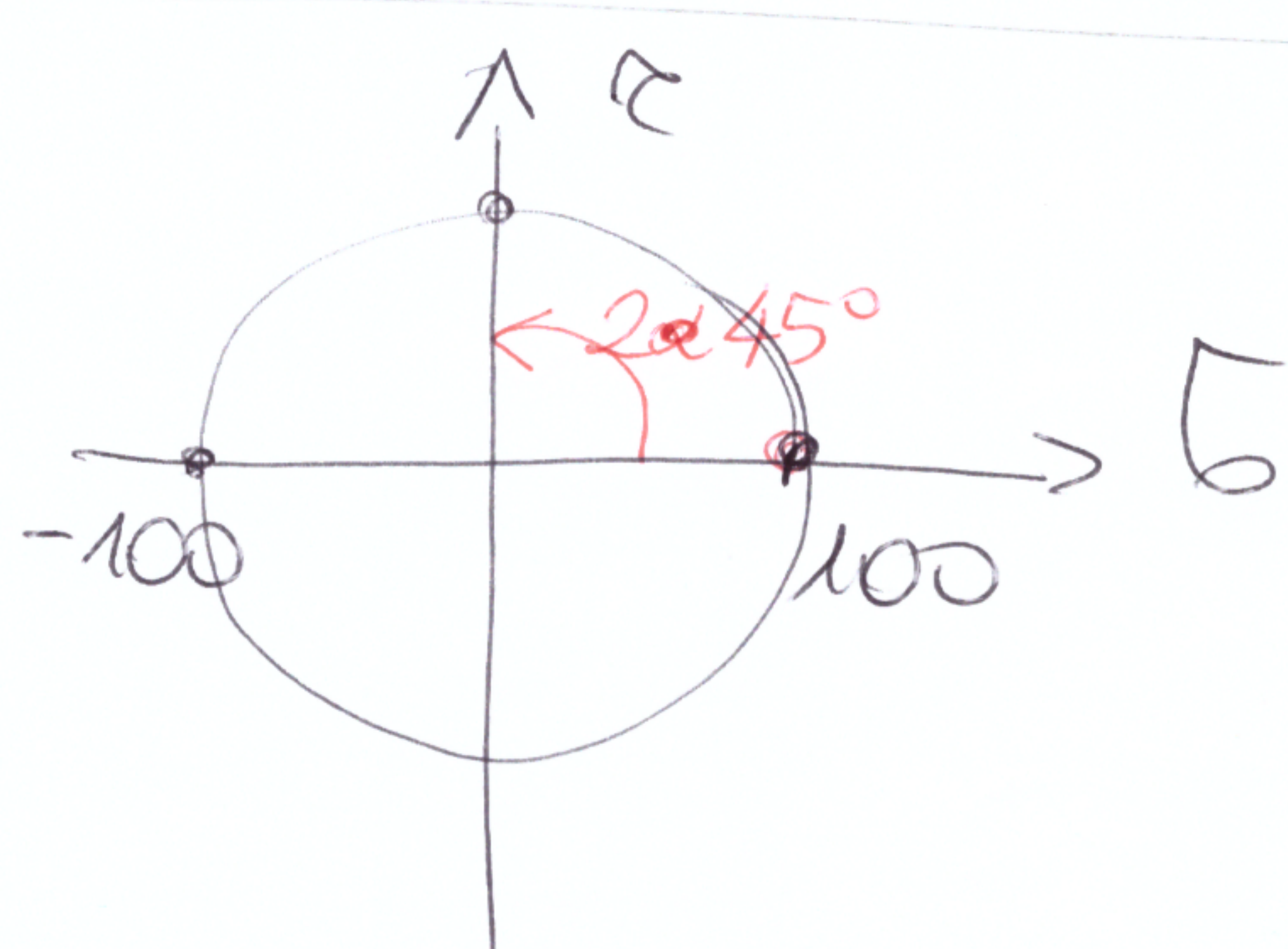
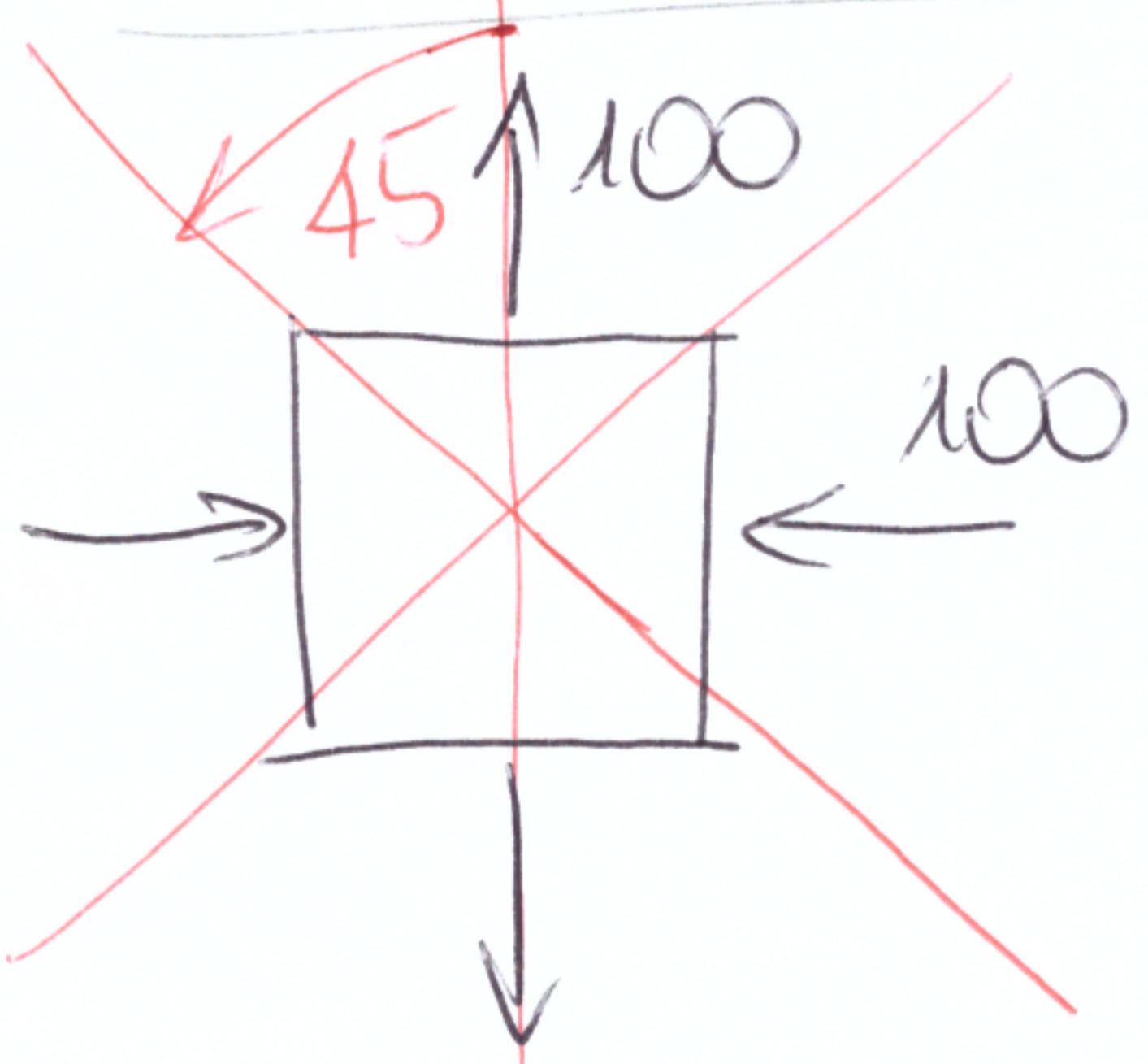
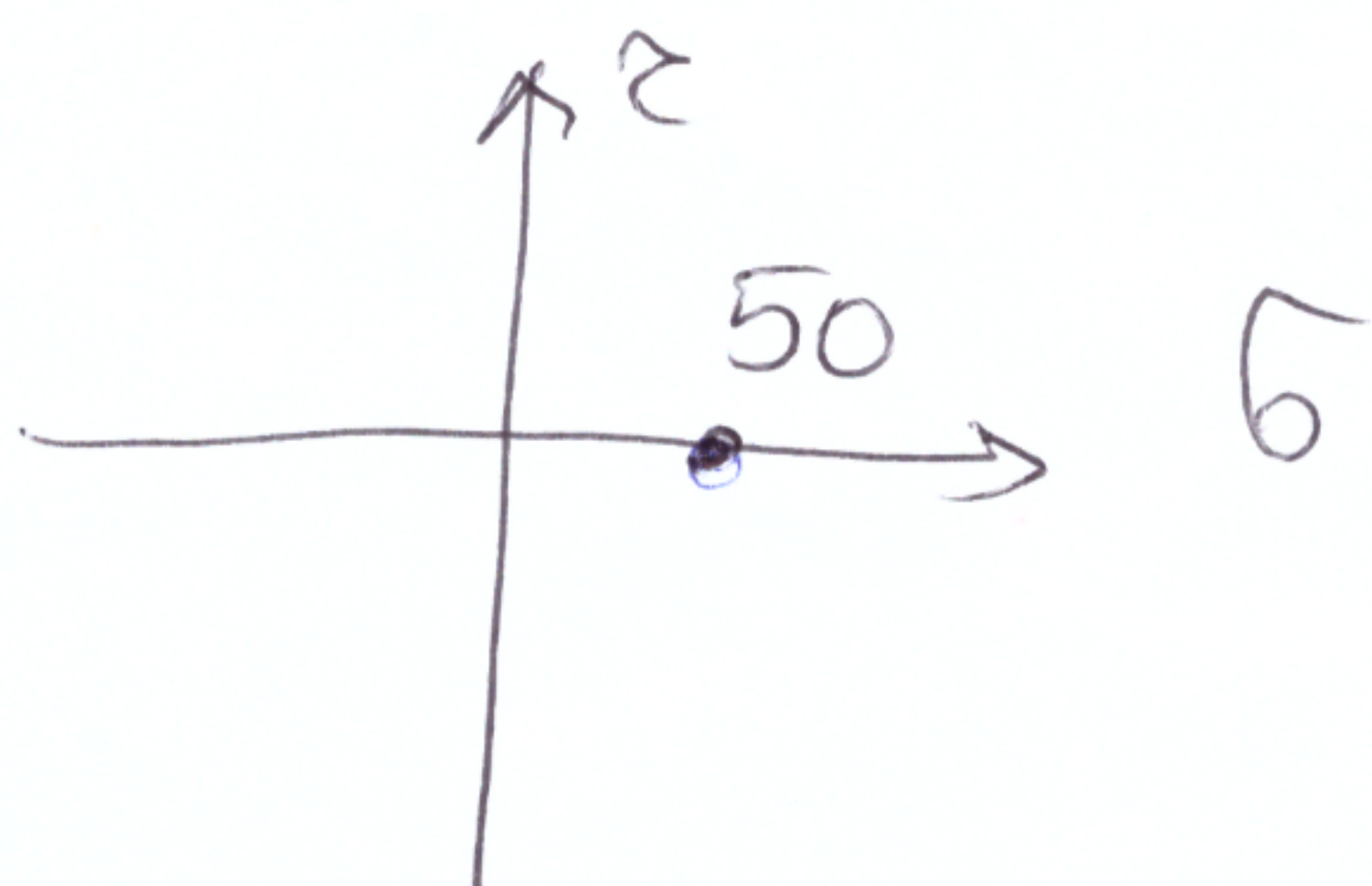
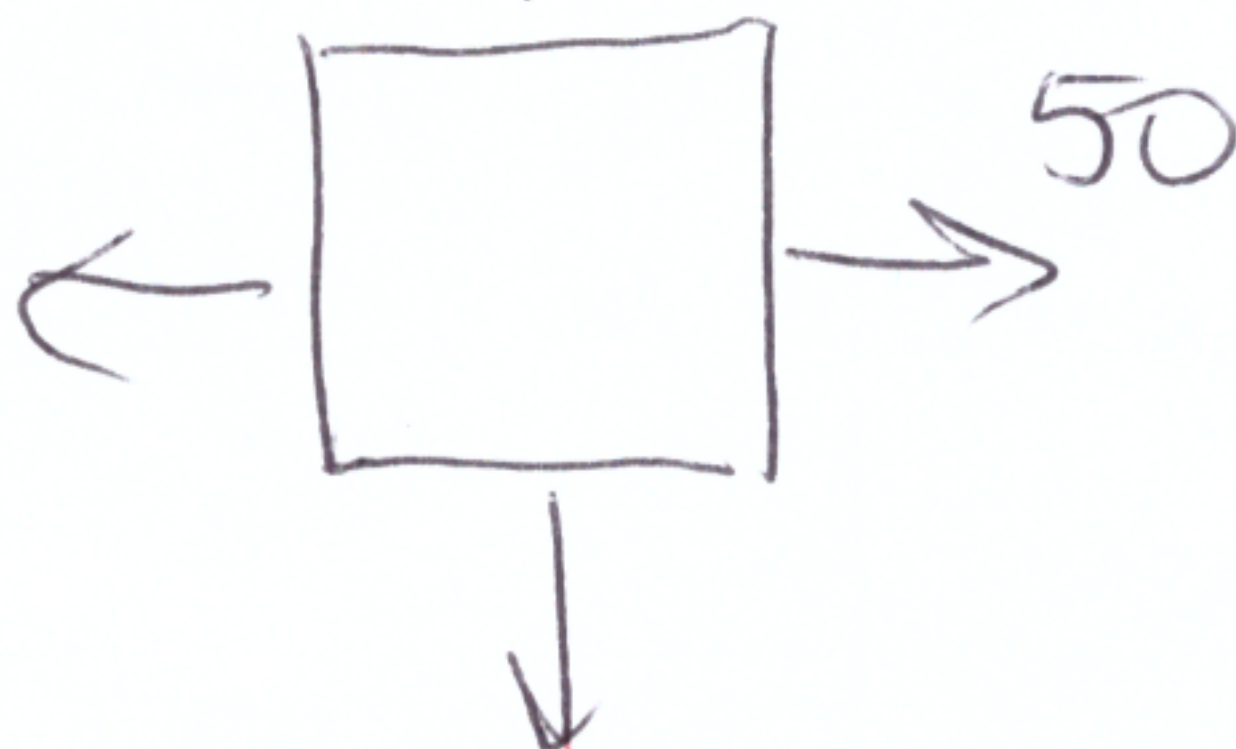
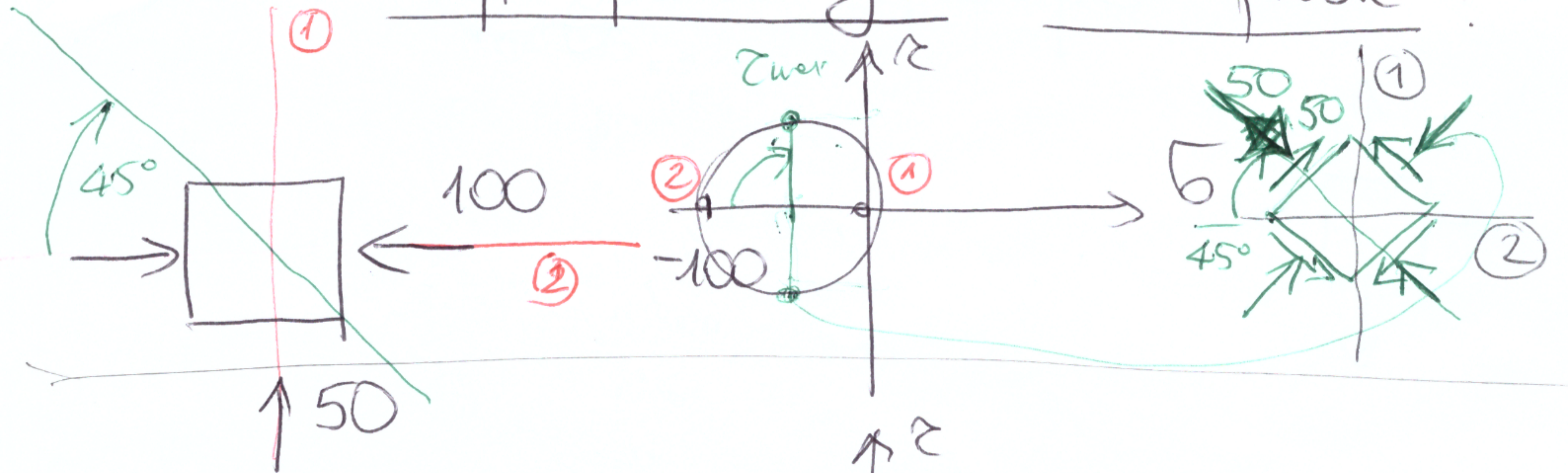
$$0, 100$$



$\beta = 30^\circ$



Sytuacje swobod. - zad. proste!

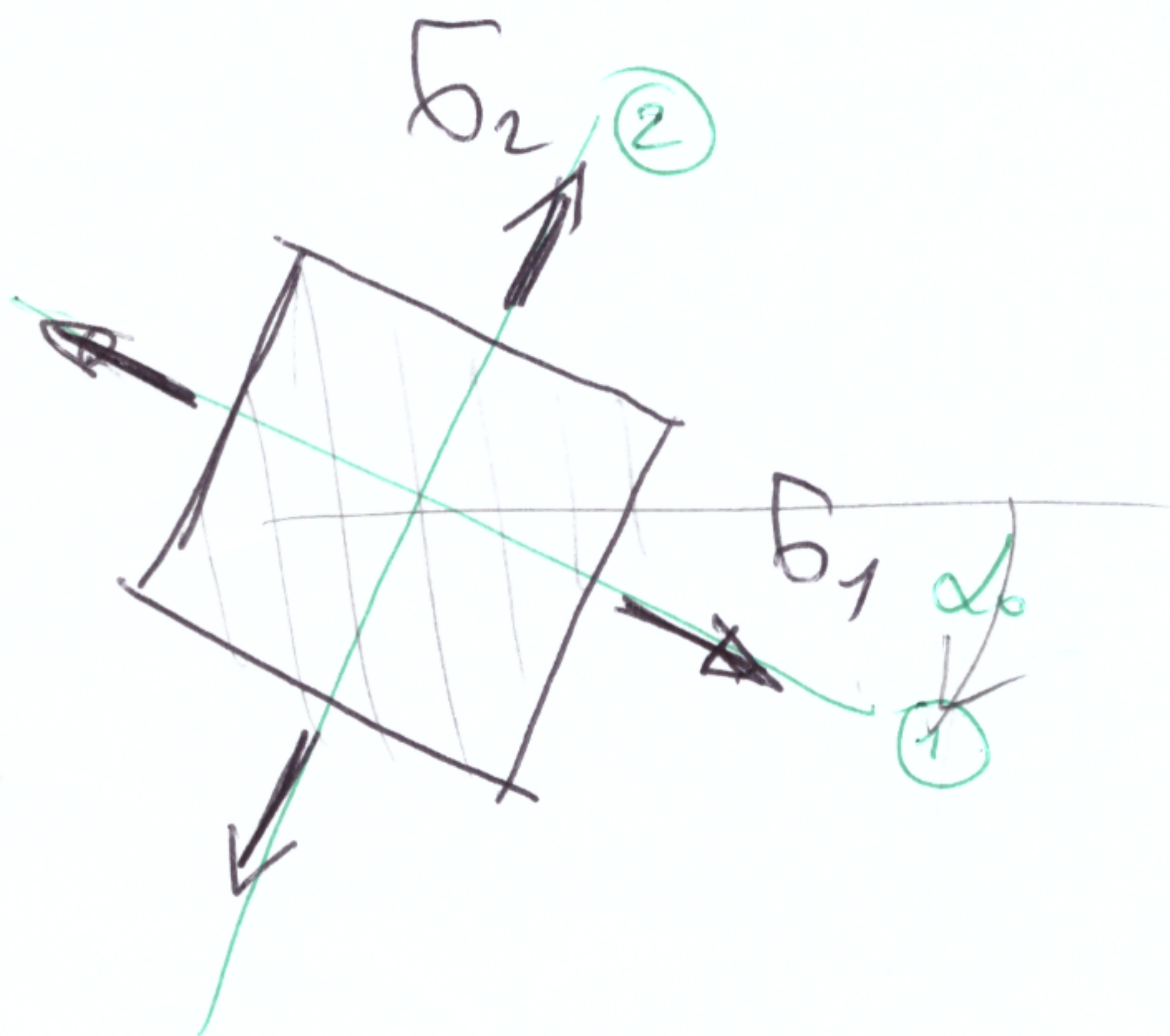
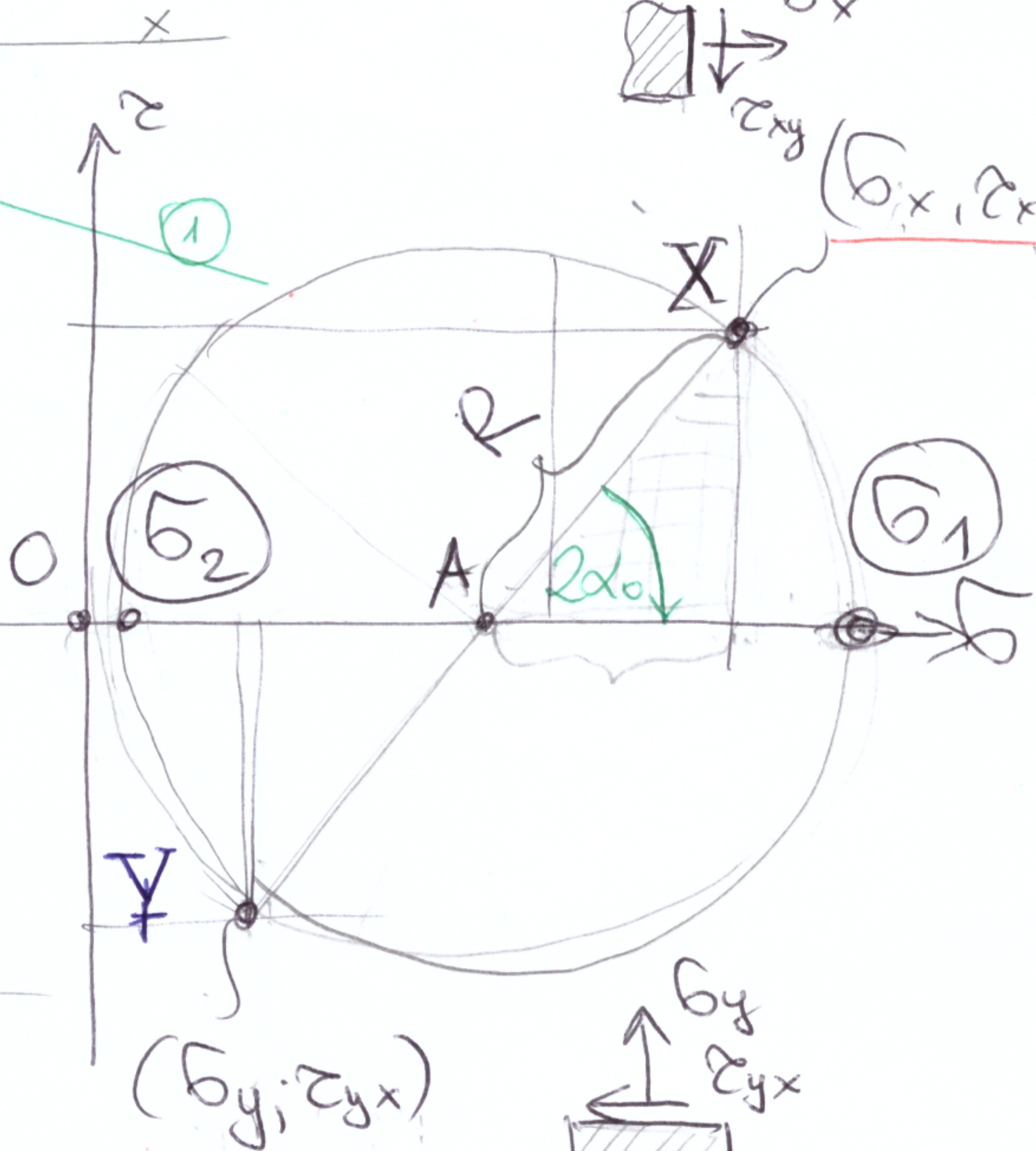
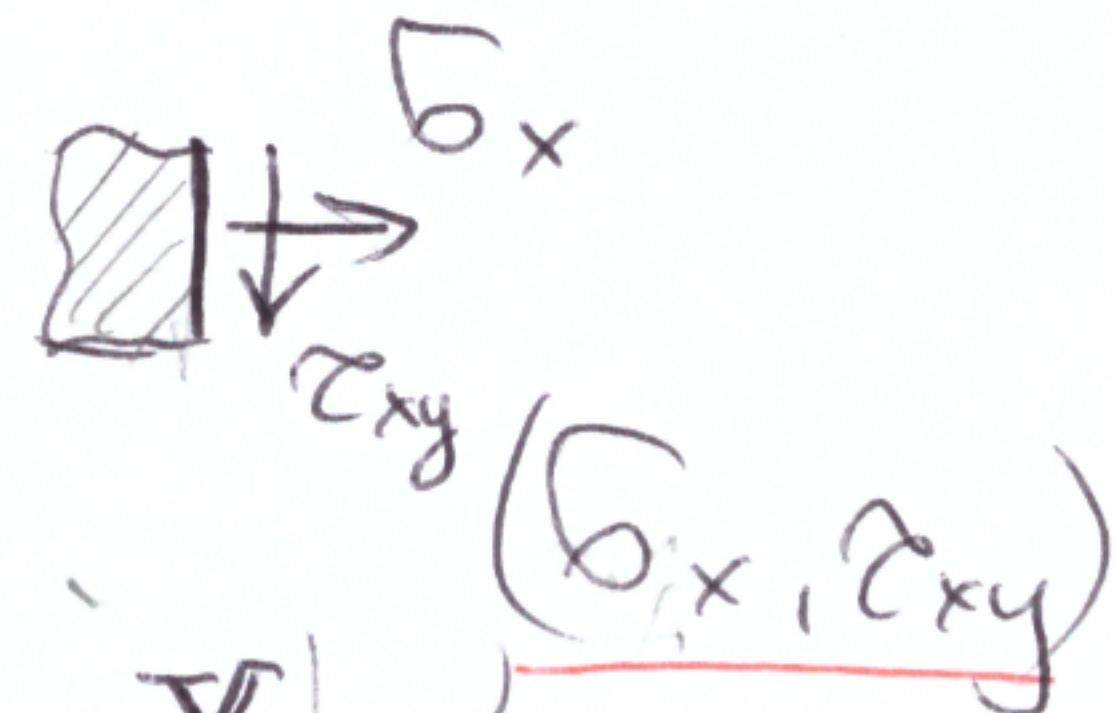
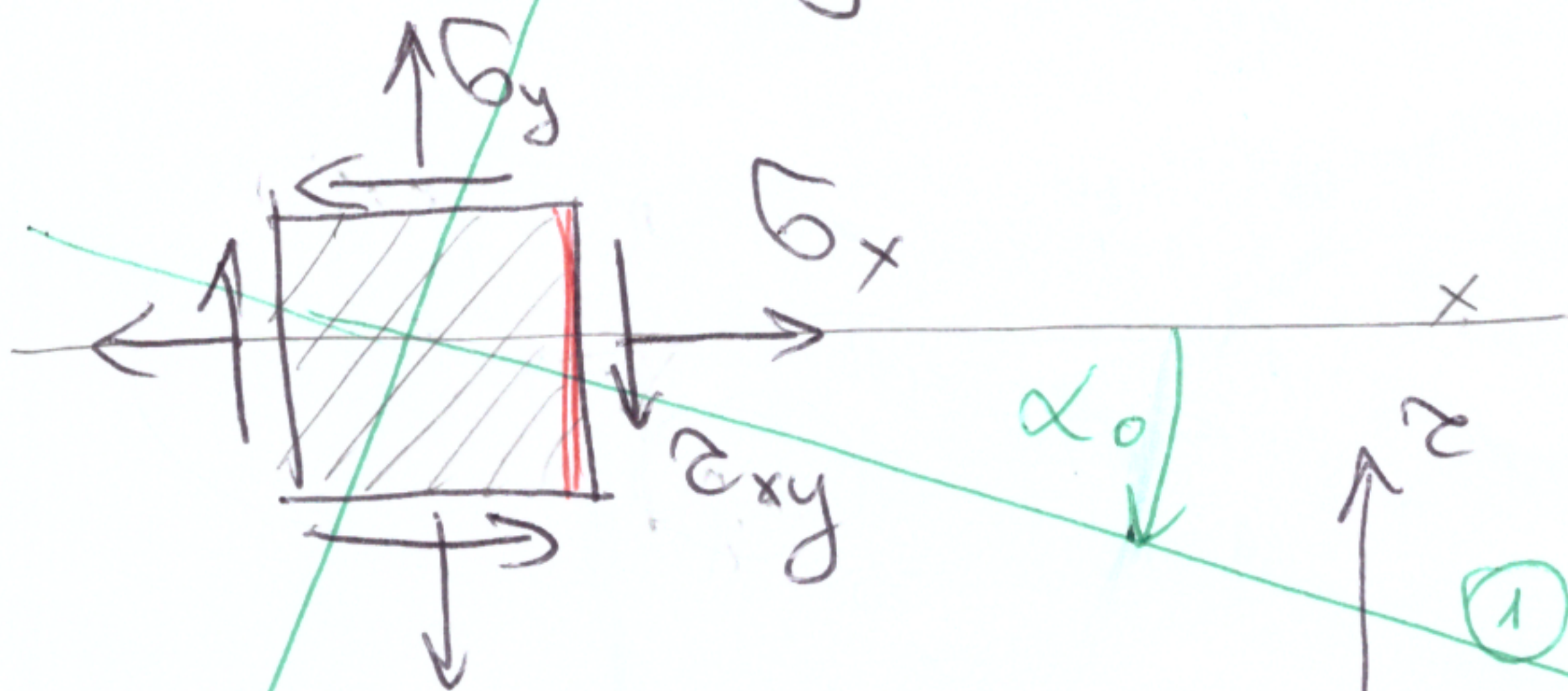




# Zad. odwrotne (PSN)

$\sigma_x, \sigma_y, \tau_{xy}$

$\sigma_1, \sigma_2, \alpha_0?$



$$\sigma_1 = OA + R$$

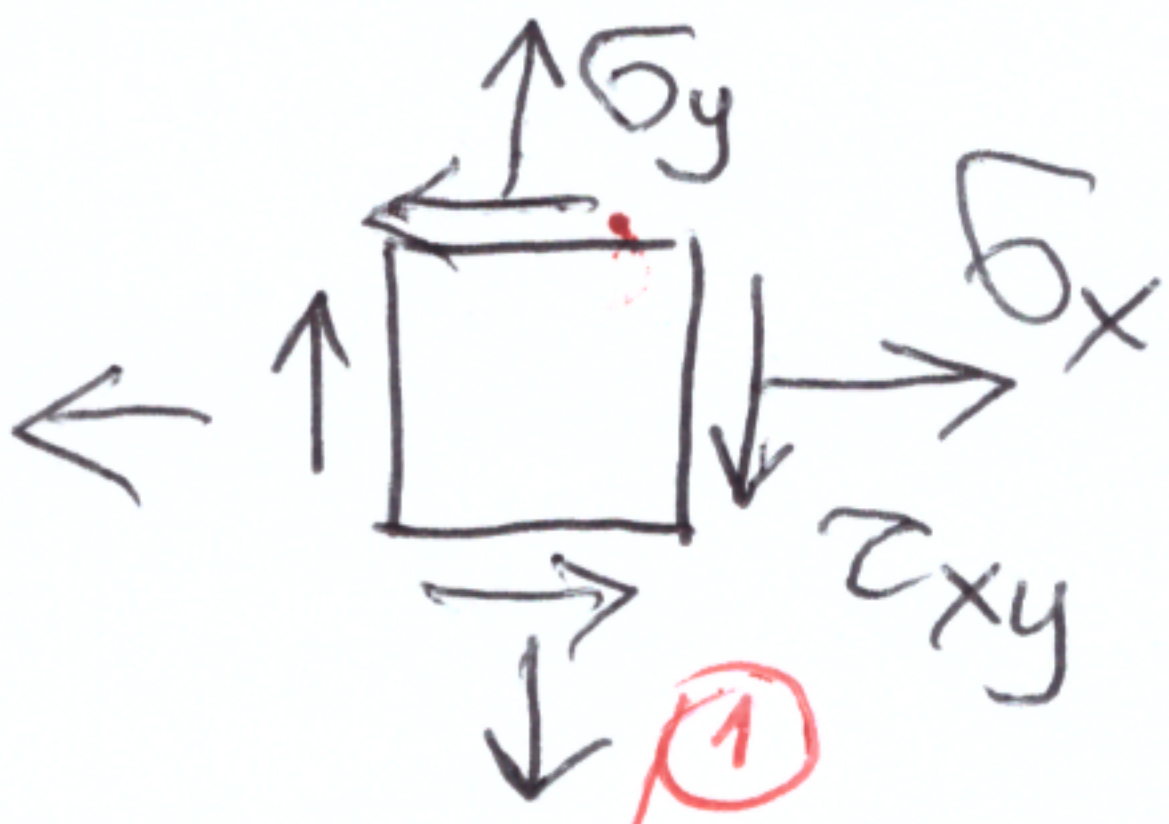
$$\sigma_2 = OA - R$$

$$R = \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

$$OA = \frac{\sigma_x + \sigma_y}{2}$$



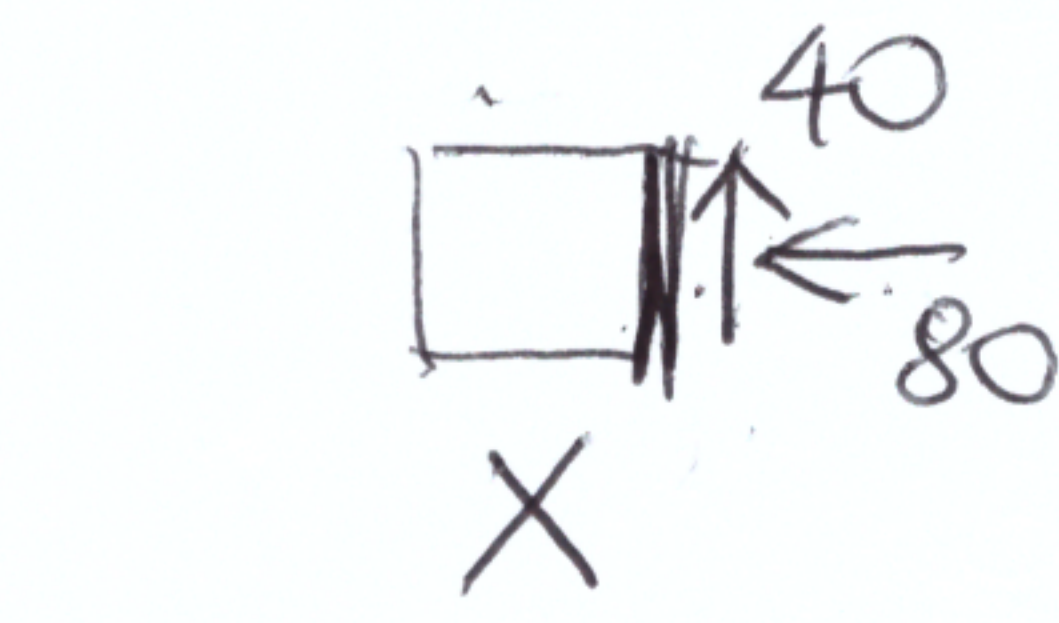
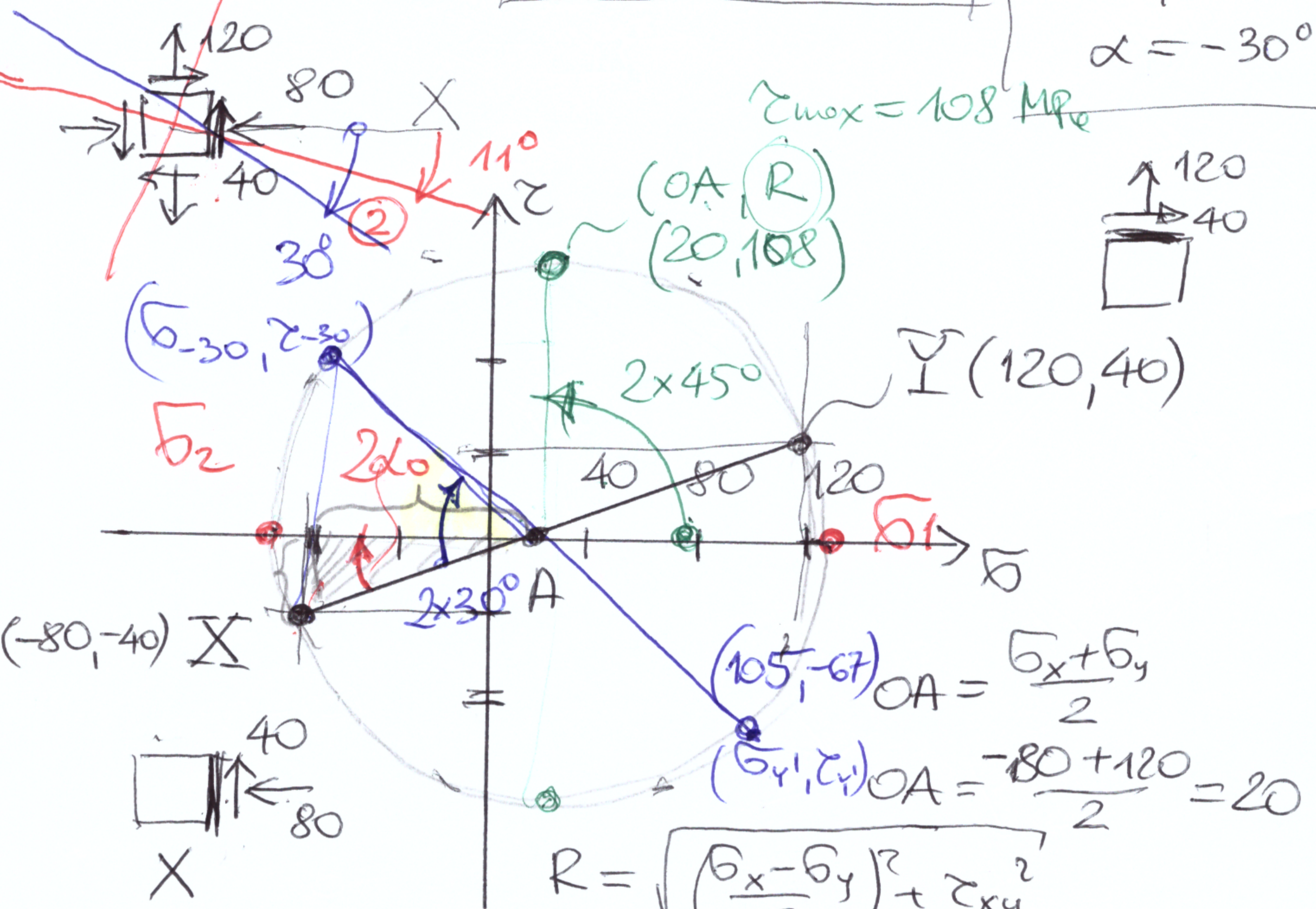
PSN



$$\begin{aligned} \sigma_x &= -80 \text{ MPa} \\ \sigma_y &= 120 \text{ MPa} \\ \tau_{xy} &= -40 \text{ MPa} \end{aligned}$$

- 1)  $\sigma_1, \sigma_2, \alpha_0$ ?
- 2)  $\tau_{max}$ ?
- 3)  $\sigma_\alpha, \tau_\alpha$   
 $\alpha = -30^\circ$

$\tau_{max} = 108 \text{ MPa}$



$$R = \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

$$R = \sqrt{\left(\frac{-80 - 120}{2}\right)^2 + (40)^2} = 108$$

$$\begin{aligned} \sigma_1 &= OA + R = 128 \text{ MPa} \\ \sigma_2 &= OA - R = -88 \text{ MPa} \end{aligned}$$

$$\tan 2\alpha_0 = \left| \frac{\tau_{xy}}{\frac{\sigma_x - \sigma_y}{2}} \right|$$

$$\alpha_0 = 10,8^\circ$$

$$\begin{aligned} \sigma_{-30} &= OA - R \cdot \cos(2\alpha - 2\alpha_0) = -65 \text{ MPa} \\ \tau_{-30} &= R \cdot \sin(2\alpha - 2\alpha_0) = 67 \text{ MPa} \end{aligned}$$



