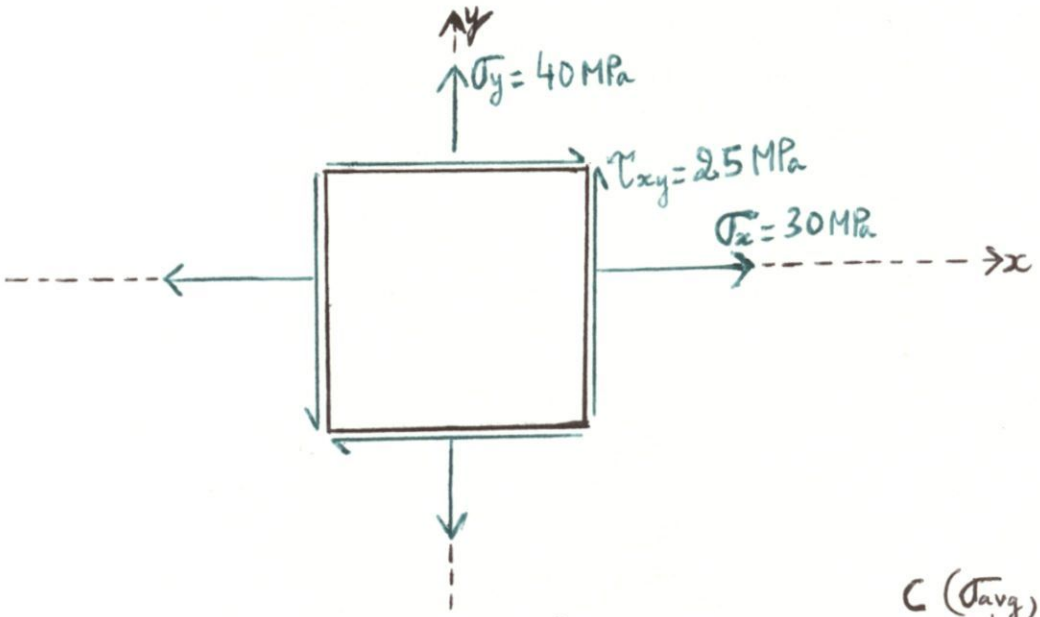
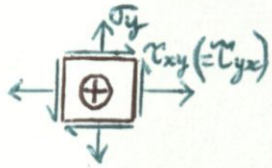
DTY Tutoring, inc.
Email: dtytutoring@gmail.com
Website:www.dtytutoring.com

Date: 7th January 2019



Positive Sign Convention



$\sigma_x = 30$ MPa
$\sigma_y = 40$ MPa
$\tau_{xy} = 25$ MPa

$$\sigma_{avg} = \frac{\sigma_x + \sigma_y}{2} = \frac{(30 + 40)\text{MPa}}{2} = 35\text{MPa} \; ; \; C(35\text{MPa}, 0)$$

$C(\sigma_{avg}, 0)$

$$\tau_{Max} = R = \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + (\tau_{xy})^2} = \sqrt{\left(\frac{30-40}{2}\right)^2 + (25)^2} = 5\sqrt{26} = 25.495\text{ MPa}$$

$\sigma_1 = \sigma_{avg} + R = (35\text{MPa}) + (25.495\text{MPa}) = 60.5\text{ MPa}$ → Principal Stress 1

$\sigma_2 = \sigma_{avg} - R = (35\text{MPa}) - (25.495\text{MPa}) = 9.51\text{ MPa}$ → Principal stress 2

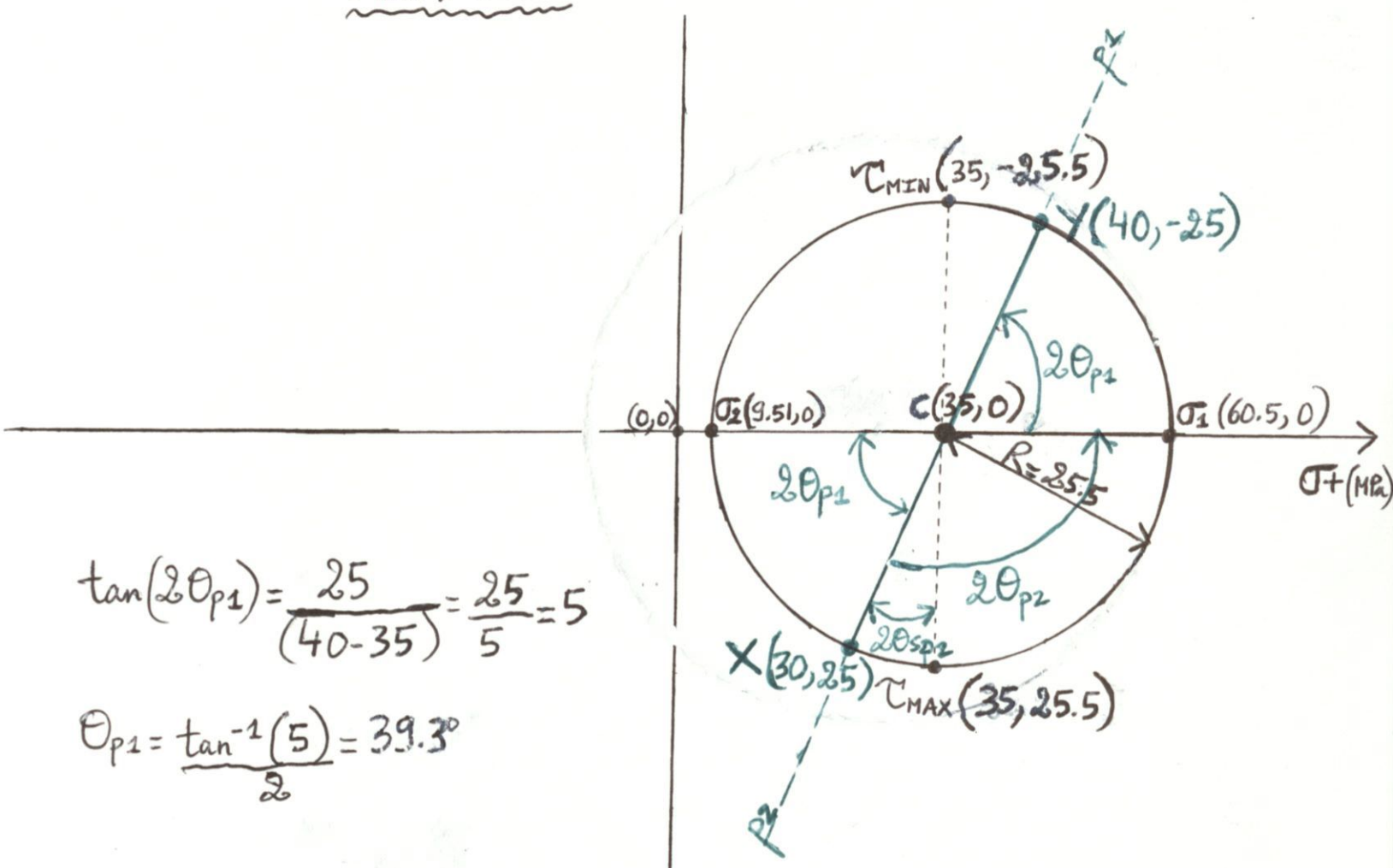
$X(\sigma_x, \tau_{xy}) \Rightarrow X(30\text{MPa}, 25\text{MPa})$

$Y(\sigma_y, -\tau_{xy}) \Rightarrow Y(40\text{MPa}, -25\text{MPa})$

DTY Tutoring, inc.
Email: dtytutoring@gmail.com
Website:www.dtytutoring.com

Date: 7th January 2019

Mohr's Circle



$$\tan(2\theta_{p1}) = \frac{25}{(40-35)} = \frac{25}{5} = 5$$

$$\theta_{p1} = \frac{\tan^{-1}(5)}{2} = 39.3°$$

$$2\theta_{sp2} = 90° - 2\theta_{p1}$$
$$= 90° - 2(39.3°)$$
$$= 11.4°$$

$$2\theta_{p2} = 90° + 2\theta_{sp2} = 101.4°$$

$$\theta_{p2} = \frac{101.4°}{2} = 50.7°$$