DTY Tutoring, inc.
Email: dtytutoring@gmail.com
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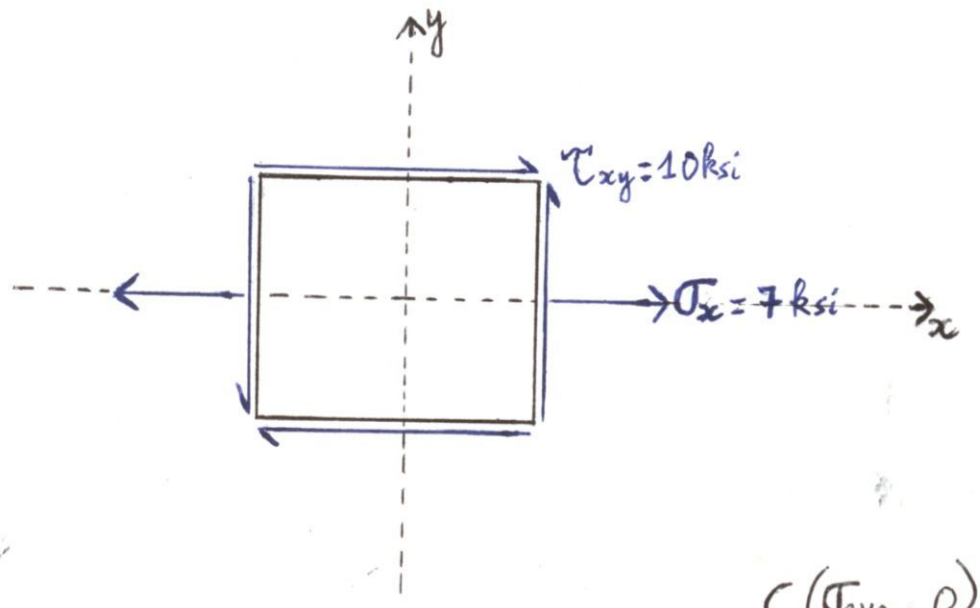
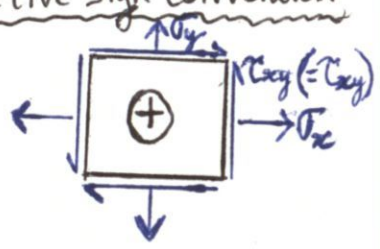
Date: 23rd May 2019



Positive sign convention



$\sigma_x = 7\ ksi$

$\sigma_y = 0\ ksi$

$\tau_{xy} = 10\ ksi$

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

$$\sigma_{avg} = \frac{\sigma_x + \sigma_y}{2} = \frac{7+0}{2} = 3.5\ ksi\ ;\ C(3.5\ ksi, 0)$$

$$\tau_{MAX} = R = \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + (\tau_{xy})^2} = \sqrt{\left(\frac{7-0}{2}\right)^2 + (10)^2} = 10.595\ ksi$$

$$\sigma_I = \sigma_{avg} + R = (3.5\ ksi) + (10.595\ ksi) = 14.095\ ksi \rightarrow \text{Principal Stress 1}$$

$$\sigma_{II} = \sigma_{avg} - R = (3.5\ ksi) - (10.595\ ksi) = -7.095\ ksi \rightarrow \text{Principal Stress 2}$$

$$X(\sigma_x, \tau_{xy}) \Rightarrow X(7, 10)$$

$$Y(\sigma_y, -\tau_{xy}) \Rightarrow Y(0, -10)$$

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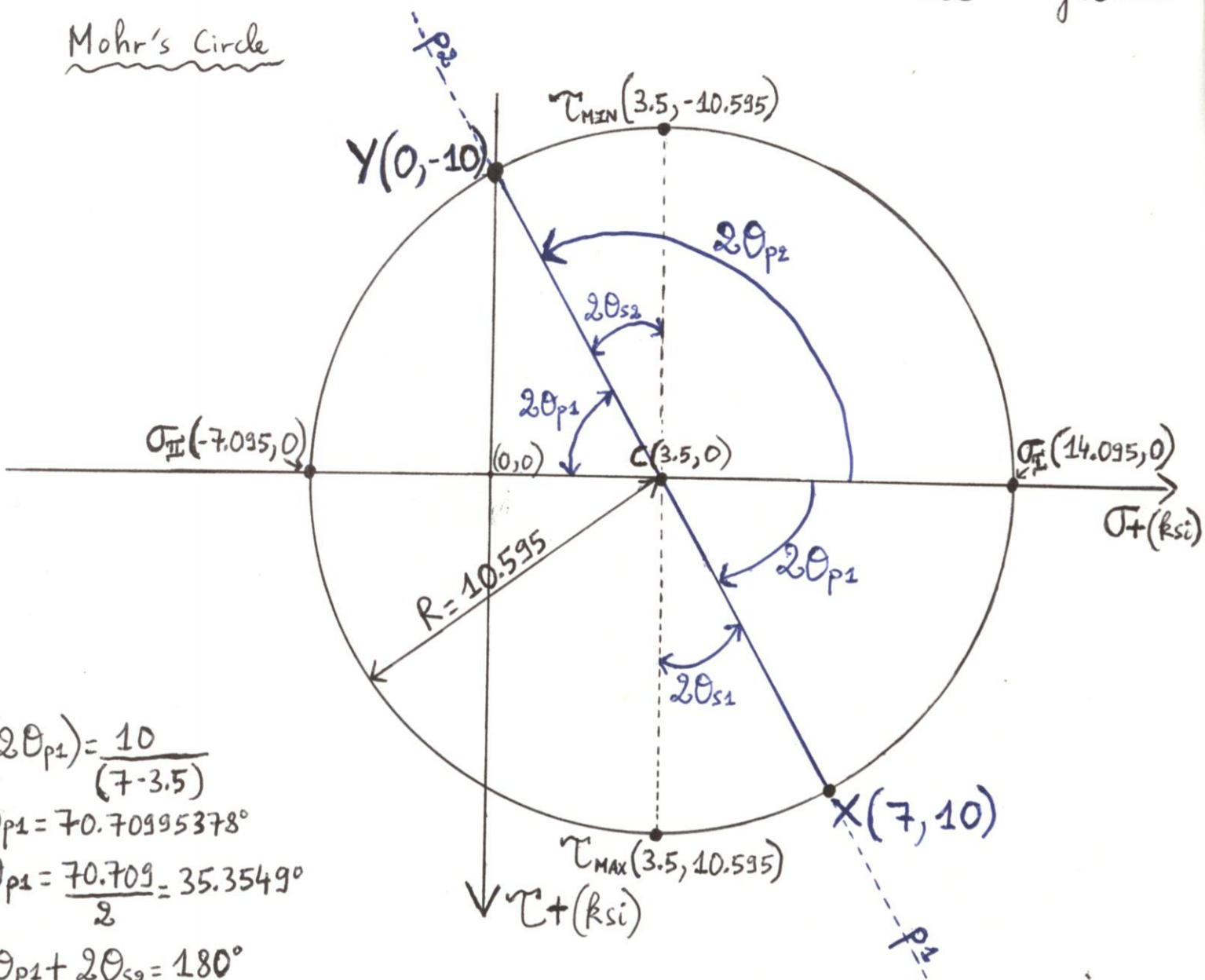
Mohr's Circle



$$\tan(2\theta_{p1}) = \frac{10}{(7-3.5)}$$

$$2\theta_{p1} = 70.70995378^\circ$$

$$\theta_{p1} = \frac{70.709}{2} = 35.3549^\circ$$

$$2\theta_{p1} + 2\theta_{s2} = 180^\circ$$

$$2\theta_{s2} = 180 - 2\theta_{p1}$$

$$\theta_{s2} = \frac{180 - 70.709}{2} = 54.645^\circ$$

$$\theta_{p2} = 90^\circ + \theta_{p1} = 90^\circ + 35.3549^\circ = 125.3549^\circ$$