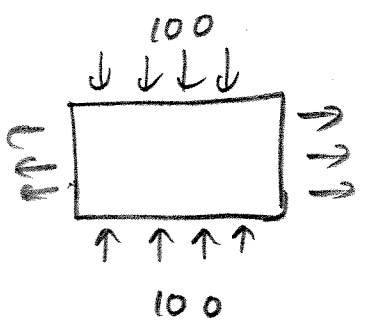
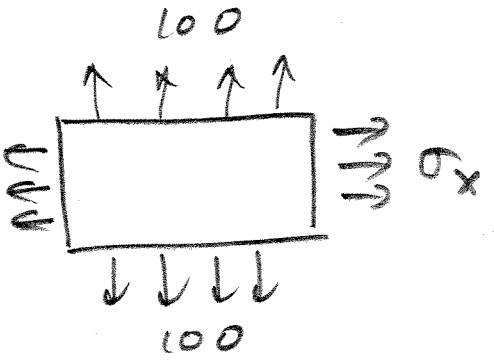
ME 423 Test #6 Name key

The yield stress in uniaxial tension for a certain metal is $\sigma_{yp} = 250$ MPa. It is now loaded in plane stress under two different situations:

(A)



(B)



with σ_x increasing from zero until yield occurs. Find this yield value in both cases for both Tresca & Von Mises theories.

A-Tresca $\quad 250 \geq \begin{cases} \sigma_x - (-100) = \sigma_x + 100 \Rightarrow \sigma_x \leq 150 \\ \sigma_x - 0 = \sigma_x \Rightarrow \sigma_x \leq 250 \\ 0 - (-100) = 100 \checkmark \end{cases}$

A-Von Mises $\quad \sigma_x^2 - (-100)\sigma_x + (-100)^2 = 250^2 \Rightarrow \sigma_x = 184.5$

B-Tresca $\quad 250 \geq \begin{cases} \sigma_x - 100 \Rightarrow \sigma_x \leq 350 \\ \sigma_x - 0 \Rightarrow \sigma_x \leq 250 \\ 100 - 0 \checkmark \end{cases}$

A-Tresca	150
A-Von Mises	184.5
B-Tresca	250
B-Von Mises	284.5

B-Von Mises

$\sigma_x^2 - 100\sigma_x + (100)^2 = 250^2$

$\Rightarrow \sigma_x = 284.5$