\( \sigma_1 = \frac{2P_2}{A_1} \)

\( \sigma_2 = \frac{P_1 - 2P_2}{A_2} \)

\( \sigma_2 = \frac{P_1}{A_2} \)

\( \sigma_2 = \frac{2P_2 - P_1}{A_2} \)
Example 4

A cylindrical punch of radius $R$ is used to perforate a hole in a metal plate of thickness $t$. If $\tau_{\text{max}}$ is the maximum shear stress that the metal will sustain before breaking, what is the minimum force $P_{\text{min}}$ that must be applied on the punch in order to perforate the paper?

\[
\sigma_{\text{cyl}} = \frac{P}{\pi R^2}
\]

\[
T = \frac{P}{A}
\]
The material below is loaded until it reaches a stress equal to 30 ksi, which corresponds to a strain equal to _________ . After unloading, the material has permanent strain equals to ___________.

a) 0.003, 0
b) 0.002, 0
c) 0.003, 0.002
d) 0.002, 0.003
1. What happens to the total deformation?
   - A) $\delta > 0$
   - B) $\delta < 0$
   - C) $\delta = 0$

2. What happens to the stress?
   - A) $\sigma > 0$
   - B) $\sigma < 0$
   - C) $\sigma = 0$

3. Mark the statement that must always be true:
   - A) $\delta_1 < 0$, $\delta_2 > 0$
   - B) $\delta_1 + \delta_2 = 0$
   - C) $\delta_1 + \delta_2 = \delta c$

4. What happens to the stress?
   - A) $\sigma_1 \neq 0$, $\sigma_2 = 0$
   - B) $\sigma_1 \neq 0$, $\sigma_2 \neq 0$
   - C) $\sigma_1 = 0$, $\sigma_2 \neq 0$
   - D) $\sigma_1 = \sigma_2$