9.4. The state of stress at a point in a member is shown on the element. Determine the stress components acting on the inclined plane AB. Solve the problem using the method of equilibrium described in Sec. 9.1.

**Force Equilibrium:** For the sectioned element,

\[ \Delta F_\gamma = 0 : \quad \Delta F_\gamma = 3(\Delta A \sin 30^\circ) \sin 60^\circ + 4(\Delta A \sin 30^\circ) \sin 30^\circ \\
-2(\Delta A \cos 30^\circ) \sin 30^\circ - 4(\Delta A \cos 30^\circ) \sin 60^\circ = 0 \]

\[ \Delta F_\gamma = 4.165 \Delta A \]

\[ \Delta F_\tau = 0 : \quad \Delta F_\tau = 3(\Delta A \sin 30^\circ) \cos 60^\circ + 4(\Delta A \sin 30^\circ) \cos 30^\circ \\
-2(\Delta A \cos 30^\circ) \cos 30^\circ + 4(\Delta A \cos 30^\circ) \cos 60^\circ = 0 \]

\[ \Delta F_\tau = -2.714 \Delta A \]

*Normal and Shear Stress:* For the inclined plane.

\[ \sigma_\gamma = \lim_{\Delta A \to 0} \frac{\Delta F_\gamma}{\Delta A} = -2.71 \text{ ksi} \quad \text{Ans} \]

\[ \tau_\gamma = \lim_{\Delta A \to 0} \frac{\Delta F_\tau}{\Delta A} = 4.17 \text{ ksi} \quad \text{Ans} \]

Negative sign indicates that the sense of \( \sigma_\gamma \) is opposite to that shown on FBD.