142. The 50-lb lamp is supported by three steel rods connected by a ring at A. Determine which rod is subjected to the greater average normal stress and compute its value. Take $\theta = 30^\circ$. The diameter of each rod is given in the figure.

\[
\begin{align*}
\sum F_x &= 0; \quad F_{AC} \cos 30^\circ - F_{AD} \cos 45^\circ = 0 \\
\sum F_y &= 0; \quad F_{AC} \sin 30^\circ + F_{AD} \sin 45^\circ - 50 = 0 \\
F_{AC} &= 36.60 \text{ lb}, \quad F_{AD} = 44.83 \text{ lb}
\end{align*}
\]

**Rod AB:**
\[
\sigma_{AB} = \frac{50}{\frac{0.35}{2}} = 520 \text{ psi}
\]

**Rod AD:**
\[
\sigma_{AD} = \frac{44.83}{\frac{0.35}{2}} = 634 \text{ psi}
\]

**Rod AC:**
\[
\sigma_{AC} = \frac{36.60}{\frac{0.25}{2}} = 746 \text{ psi} \quad \text{Ans}
\]

1-35. The anchor shackle supports a cable force of 600 lb. If the pin has a diameter of 0.25 in., determine the average shear stress in the pin.

\[
\sum F_y = 0; \quad 2V - 600 = 0 \\
V = 300 \text{ lb}
\]

\[
\tau_{AV} = \frac{V}{A} = \frac{300}{\frac{0.25}{2}} = 6.11 \text{ kip/in} \quad \text{Ans}
\]

1-38. The joint is fastened together using two bolts. Determine the required diameter of the bolts if the failure shear stress for the bolts is $T_{F_{u}} = 350 \text{ MPa}$. Use a factor of safety for shear of $F.S. = 2.5$.

\[
\frac{350(10^6)}{2.5} = \frac{140(10^6)}{20(10^6)} \cdot \frac{20(10^6)}{\frac{4}{3}d^2}
\]

\[
d = 0.0135 \text{ m} = 13.5 \text{ mm} \quad \text{Ans}
\]