1.102 Determine the height water at 60 °F will rise due to capillary action in a clean, 1-in.-diameter tube. What will be the height if the diameter is reduced to 0.01 in.?

\[ h = \frac{2 \sigma \cos \theta}{\gamma R} \]  
\( \text{(Eq. 1.22)} \)

For water at 60 °F (from Table B.1 in Appendix B),
\[ \sigma = 5.03 \times 10^{-3} \text{ lb/ft}^2 \quad \text{and} \quad \gamma = 62.37 \frac{\text{lb}}{\text{ft}^2}. \]
Thus, with \( \theta = 0 \),
\( \text{for } R = 0.125 \text{ in.} \)
\[ h = \frac{2 (5.03 \times 10^{-3} \frac{\text{lb}}{\text{ft}^2}) (1)}{(62.37 \frac{\text{lb}}{\text{ft}^2}) (0.125 \text{ ft})} = 1.55 \times 10^{-2} \text{ ft} \]

or
\[ h = \text{(1.55 \times 10^{-2} \text{ ft})(12 \text{ in.})} = 0.186 \text{ in.} \]

Similarly,
( for \( R = 0.005 \text{ in.} \) )
\[ h = \text{(0.186 in.) (0.125 in.) (0.005 in.)} = 4.65 \text{ in.} \]