6.16 This problem asks that we compute Poisson's ratio for the metal alloy. From Equations 6.5 and 6.1

$$\varepsilon_z = \frac{\sigma}{E} = \frac{F}{A_0 E} = \frac{F}{\pi \left(\dfrac{d_0}{2}\right)^2 E} = \frac{4F}{\pi d_0^2 E}$$

Since the transverse strain ε_x is just

$$\varepsilon_x = \frac{\Delta d}{d_0}$$

and Poisson's ratio is defined by Equation 6.8, then

$$\nu = -\frac{\varepsilon_x}{\varepsilon_z} = -\frac{\Delta d / d_0}{\left(\dfrac{4F}{\pi d_0^2 E}\right)} = -\frac{d_0 \Delta d \, \pi \, E}{4F}$$

$$= -\frac{\left(10 \text{ x } 10^{-3} \text{ m}\right)\left(-7 \text{ x } 10^{-6} \text{ m}\right) (\pi)\left(100 \text{ x } 10^9 \text{ N/m}^2\right)}{(4)(15{,}000 \text{ N})} = 0.367$$