6.7 (a) This portion of the problem calls for a determination of the maximum load that can be applied without plastic deformation (F_y). Taking the yield strength to be 345 MPa, and employment of Equation 6.1 leads to

$$F_y = \sigma_y A_0 = (345 \times 10^6 \text{ N/m}^2)(130 \times 10^{-6} \text{ m}^2)$$

$$= 44{,}850 \text{ N} \quad (10{,}000 \text{ lb}_f)$$

(b) The maximum length to which the sample may be deformed without plastic deformation is determined from Equations 6.2 and 6.5 as

$$l_i = l_0\left(1 + \frac{\sigma}{E}\right)$$

$$= (76 \text{ mm})\left[1 + \frac{345 \text{ MPa}}{103 \times 10^3 \text{ MPa}}\right] = 76.25 \text{ mm} \quad (3.01 \text{ in.})$$