$$E = \frac{\Delta\sigma}{\Delta\varepsilon} = \frac{50 \text{ MPa} - 0 \text{ MPa}}{0.001 - 0} = 50 \text{ x } 10^3 \text{ MPa} = 50 \text{ GPa} \quad (7.3 \text{ x } 10^6 \text{ psi})$$

(c) For the yield strength, the 0.002 strain offset line is drawn dashed. It intersects the stress-strain curve at approximately 140 MPa (20,300 psi).

(d) The tensile strength is approximately 230 MPa (33,350 psi), corresponding to the maximum stress on the complete stress-strain plot.

(e) From Equation 6.14, the modulus of resilience is just

$$U_r = \frac{\sigma_y^2}{2E}$$

which, using data computed above, yields a value of

$$U_r = \frac{(140 \text{ x } 10^6 \text{ N/m}^2)^2}{(2)(50 \text{ x } 10^9 \text{ N/m}^2)} = 1.96 \text{ x } 10^5 \text{ J/m}^3 \quad (28.4 \text{ in.-lb}_\text{f}/\text{in.}^3)$$

(f) The ductility, in percent elongation, is just the plastic strain at fracture, multiplied by one-hundred. The total fracture strain at fracture is 0.110; subtracting out the elastic strain (which is about 0.003) leaves a plastic strain of 0.107. Thus, the ductility is about 10.7%EL.