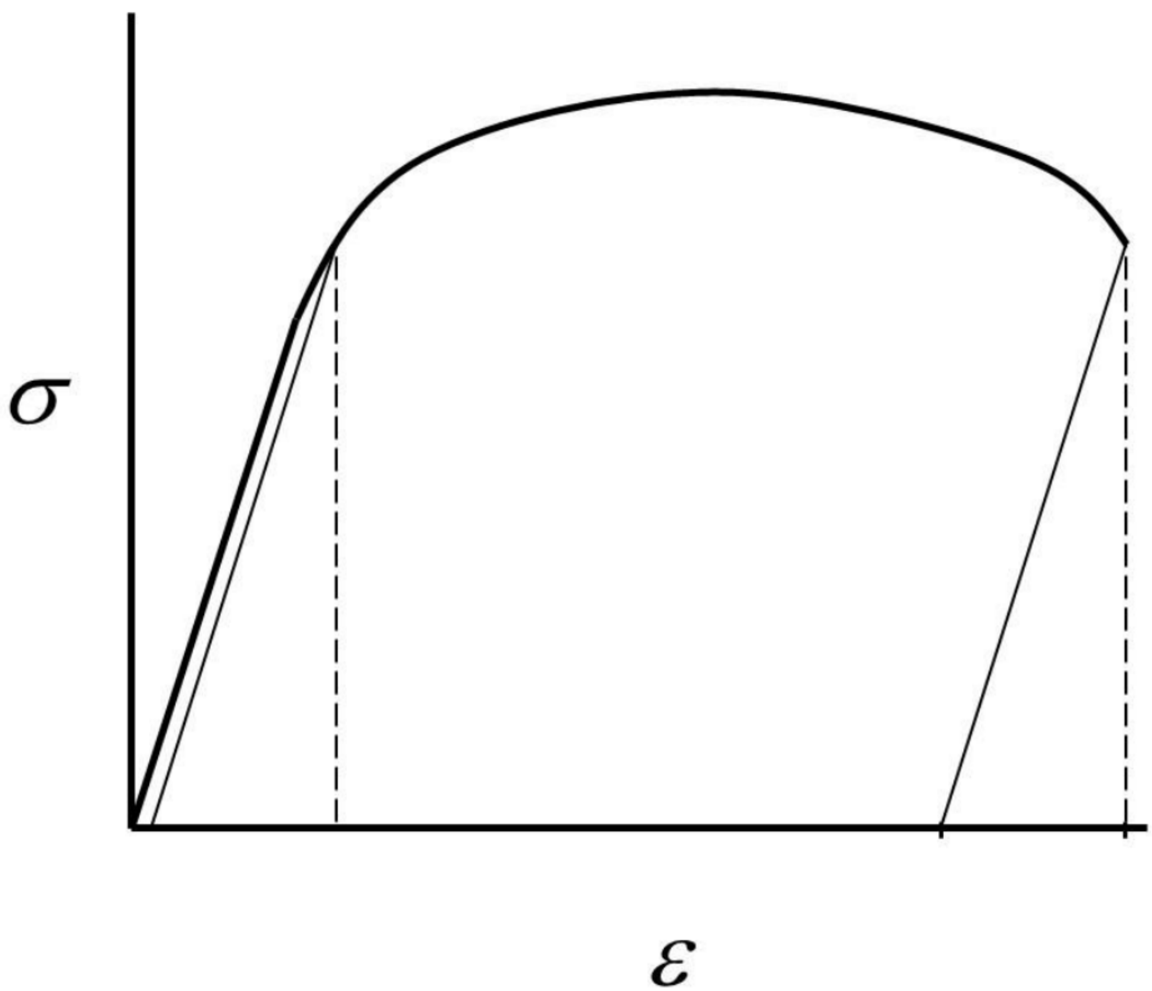
1. Define each of the following terms and identify on the stress-strain curve below
    i. 0.2% offset yield strength
    ii. Fracture strength
    iii. Ultimate tensile strength
    iv. Young's modulus
    v. Onset of localized deformation
    vi. Strain to fracture



2. An aluminum bar 30cm long with a square cross section (edge width of 10mm) is pulled in tension with a load of 66kN and experiences an elongation of 0.5mm. If the deformation is entirely elastic, calculate the modulus of elasticity of the aluminum

3. A hypothetical metal has a Young's modulus of 200GPa and a yield strength of 600MPa. This cylindrical sample with a diameter of 10mm and length of 500mm has elongated to a final length of 506mm. Is this bar undergoing elastic or plastic deformation? If this were purely elastic deformation, what is the maximum length that the sample could elongate to?

4. A cylindrical steel rod having a diameter of 12.8 mm is pulled till fracture and found to have an engineering fracture strength of 460MPa. If the cross-sectional diameter at fracture is 10.7 mm. determine the following:
    a. The ductility in terms of percent reduction in area
    b. The true stress at fracture

Additional Problems

1. A tensile stress is to be applied along the long axis of a cylindrical brass rod that has a diameter of 10mm. Determine the magnitude of the load required to produce a 2.5×10^{-3} mm change in diameter if the deformation is entirely elastic. Poisson's ratio for brass is 0.34 and the modulus of elasticity is 97 GPa.
2. For a brass alloy, the stress at which plastic deformation begins is 275 MPa, and the modulus of elasticity is 115 GPa.
   a. What is the maximum load that can be applied to a specimen with a cross-sectional area of 325 mm^2 without plastic deformation?
   b. If the original specimen length is 115mm, what is the maximum length to which it can be stretched without causing plastic deformation?