Solving session 1

Problem 3.1

- A tensile test specimen has a gage length = 50 mm and its cross-sectional area = 100 mm^2.
- The specimen yields at 48 kN, and the corresponding gage length = 50.23 mm. This is the 0.2 percent yield point.
- The maximum load of 87 kN is reached at a gage length = 64.2 mm.
- Determine (a) yield strength, (b) modulus of elasticity, and (c) tensile strength. (d) If fracture occurs at a gage length of 67.3 mm, determine the percent elongation. (e) If the specimen necked to an area = 53 mm^2, determine the percent reduction in area.

Problem 3.2

- The following force/displacement data were collected during a tensile test in which the starting gage length = 100 mm and the cross-sectional area = 150 mm^2:

Point	1	2	3	4	5	6
Displacement (mm)	0.2	3.5	10.5	22.0	30.0	35.1
Force (kN)	17.79	23.04	27.37	28.91	27.40	20.46

- The final data point (6) occurred immediately prior to failure. Yielding occurred at a load of 19.39 kN (0.2% offset value), and the maximum load (4) was 29.42 kN.
- (a) Plot the engineering stress strain curve. Determine (b) yield strength, (c) modulus of elasticity, (d) tensile strength, and (e) percent elongation.

Problem 3.3

- In Problem 3.2, determine the strength coefficient and the strain-hardening exponent in the flow curve equation.

Problem 3.18

- In a Brinell hardness test, a 1500-kg load is pressed into a specimen using a 10-mm-diameter hardened steel ball. The resulting indentation has a diameter = 3.2 mm.
- (a) Determine the Brinell hardness number for the metal. (b) If the specimen is steel, estimate the tensile strength of the steel.