In The name of God

Mechanical properties of materials I Homework set 1

#1 Assume a standard tensile specimen of 2.00 inch gage length and 0.505 inch diameter. The final diameter after failure is 0.419 inches. Determine

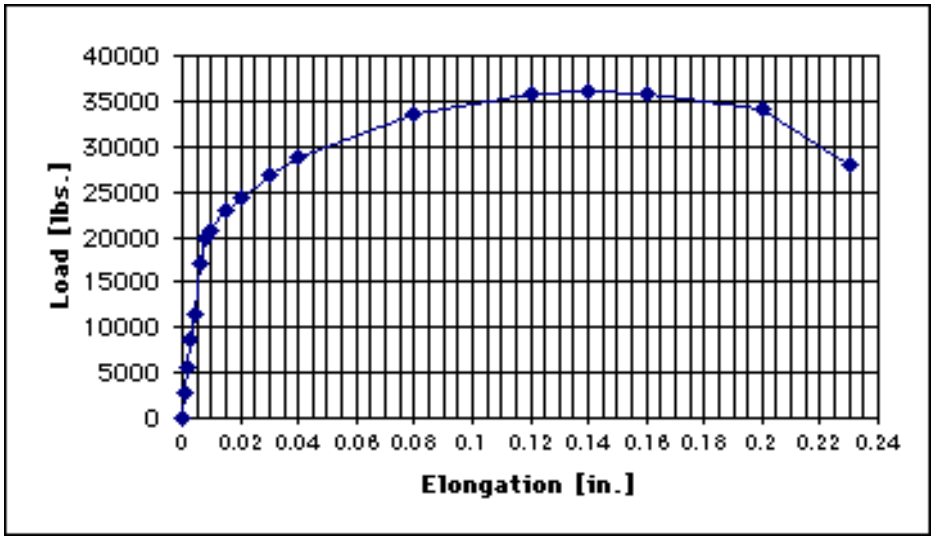
a) Young's Modulus:

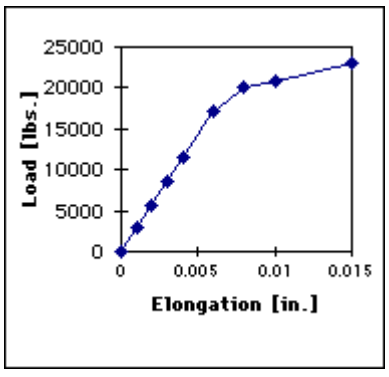
b) 0.2% Offset Yield Strength

c) UTS

d) True strain at failure

e) True stress at an elongation of 0.04 inches.





#2 a) 2 inch long steel sample ($E = 30 \times 10^6$ psi) is stretched to exactly the 0.2% yield stress and unloaded, what will be its final length?

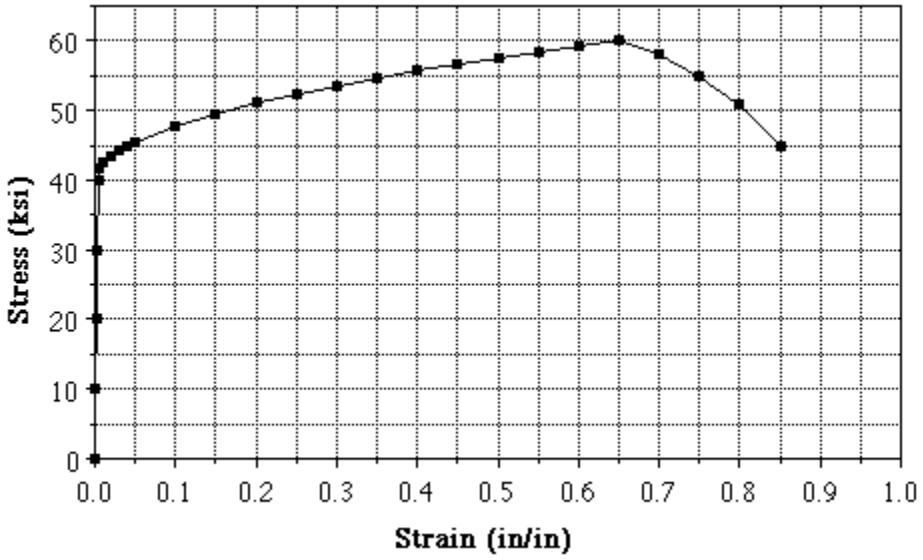
b)The same 0.505 inch diameter specimen is loaded to the maximum load point (P_{max} = 16,000 lbs, ΔL_{total} = 0.28 inches) and unloaded. What will be its length after unloading?

c) What will be the diameter of the sample when the neck forms?

#3 The tensile test data below was obtained on a cylindrical aluminum sample 4.0 inches long. Answer the following questions.

a) What is the specimen diameter for which a load of 4,000 lbs. results in a 0.600 inch permanent elongation?

b) What is the strain hardening exponent, n, for this alloy?



4 The wire drawing process for Cu wire reduces a cylindrical ingot with initial dimensions of 24 inches diameter and 10 feet long into a wire 0.06 inches in diameter.

a) How much true strain has the Cu received?

b) What is the percentage cold work?

c) How long is the final wire?

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