Tensile Test Assignment

For Sessions 803, 804, and 805
**Assigned:** Thursday, 10/05 **Due:** Thursday, 10/12

For Sessions 801 and 802
**Assigned:** Tuesday, 10/10 **Due:** Thursday, 10/17

A load-extension (deformation) curve from the tensile test of a test coupon was measured by the MTS machines located in Southwick Hall Room 122, as shown in Fig. 1. You are provided with the following information about the test coupon.

![Load-extension (deformation) curve](image)

**Figure 1: Load-extension (deformation) curve**

- The tensile test coupon is made of steel.
- The original cross sectional area is $A_0 = 0.2 \text{ in}^2$. 
• The final cross sectional area is \( A_f = 0.057 \text{ in}^2 \).

• The original length of the coupon is \( L_0 = 0.87 \text{ in} \).

With the information provided, there are twelve questions regarding the tensile test result of the coupon.

1. What is the engineering stress \( \sigma_e \) and engineering strain \( \epsilon \) of the test coupon when the load = 10 kips?

2. What is the true stress \( \sigma \) and true strain \( \epsilon \) of the test coupon when the load = 10 kips?

3. What is the percent reduction in area?

4. What is the percent elongation?

5. What is the Young’s modulus of the test coupon?

6. What is the 0.2% offset yield strength \( \sigma_y \)?

7. What is the modulus of resilience of the \( \sigma - \epsilon \) curve?

8. What is the ductility of the \( \sigma - \epsilon \) curve?

9. What is the toughness of the \( \sigma - \epsilon \) curve?

10. What is the proportional limit of the coupon?

11. What is the ultimate tensile strength \( \sigma_u \)?

12. What is the fracture strength \( \sigma_f \)?