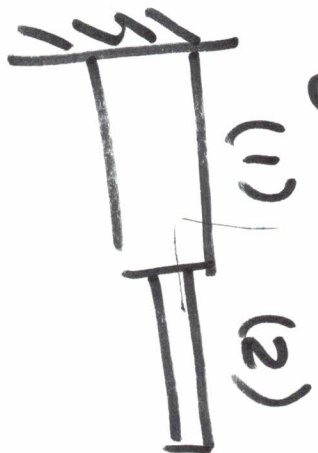


3. Segments of constant F, A, E over L



$$e_{total} = e_1 + e_2$$

$$e_{total} = \left(\frac{FL}{AE}\right)_1 + \left(\frac{FL}{AE}\right)_2$$

$$e_{total} = \frac{F_1 L_1}{A_1 E_1} + \frac{F_2 L_2}{A_2 E_2}$$

$$L_1 = 12'' \quad d_1 = 3'' \quad E_1$$

$$L_2 = 6'' \quad d_2 = 1'' \quad E_2$$

Example: 500 lbs



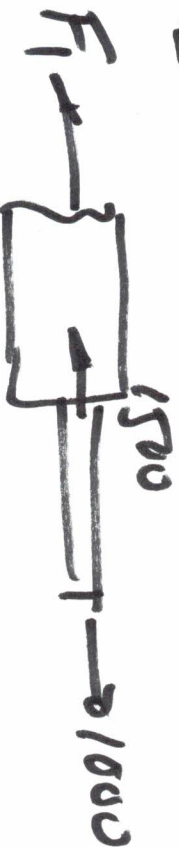
$$\text{Find } e_{total} = e_1 + e_2 = \frac{F_1 L_1}{A_1 E_1} + \frac{F_2 L_2}{A_2 E_2}$$



$$\sum F_x \rightarrow +$$

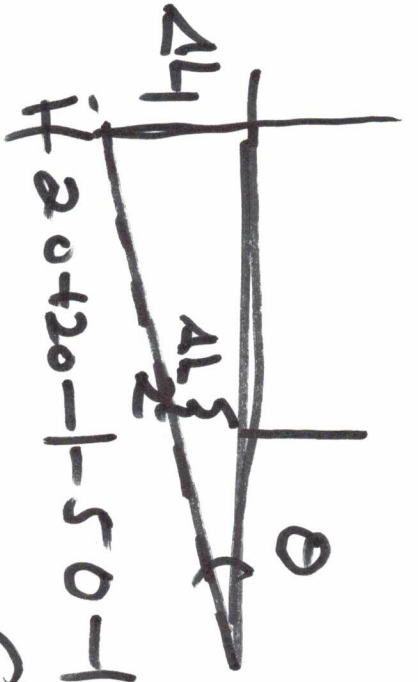
$$-F_1 - 1500 + 1000 = 0$$

$$F_1 = -500 \text{ lbs}$$



$$E_{total} = \frac{-500 (12)}{\pi (3)^2 E_1} + \frac{1000 (6)}{\pi (1)^2 E_2}$$

$$\epsilon = \frac{\Delta L}{L_0}$$

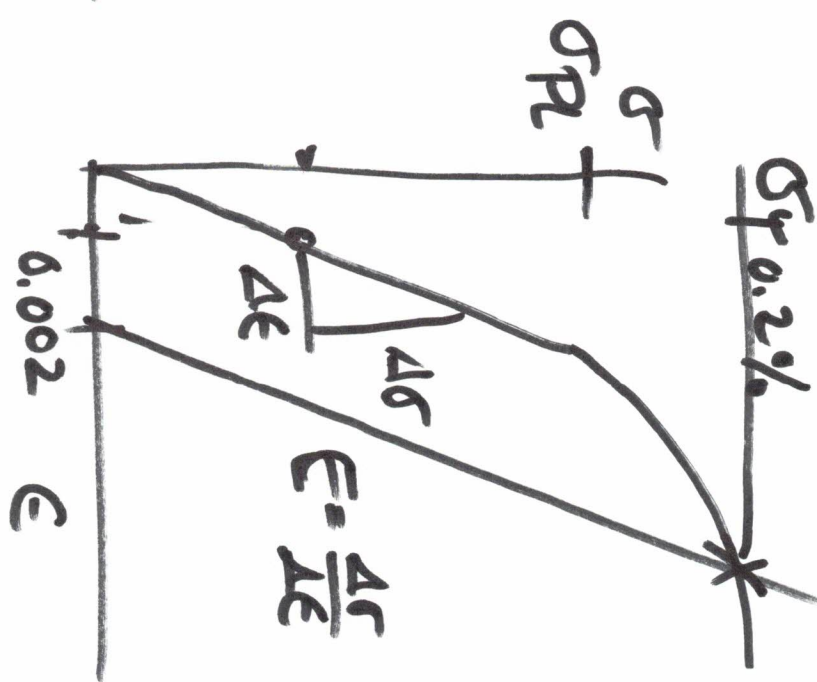
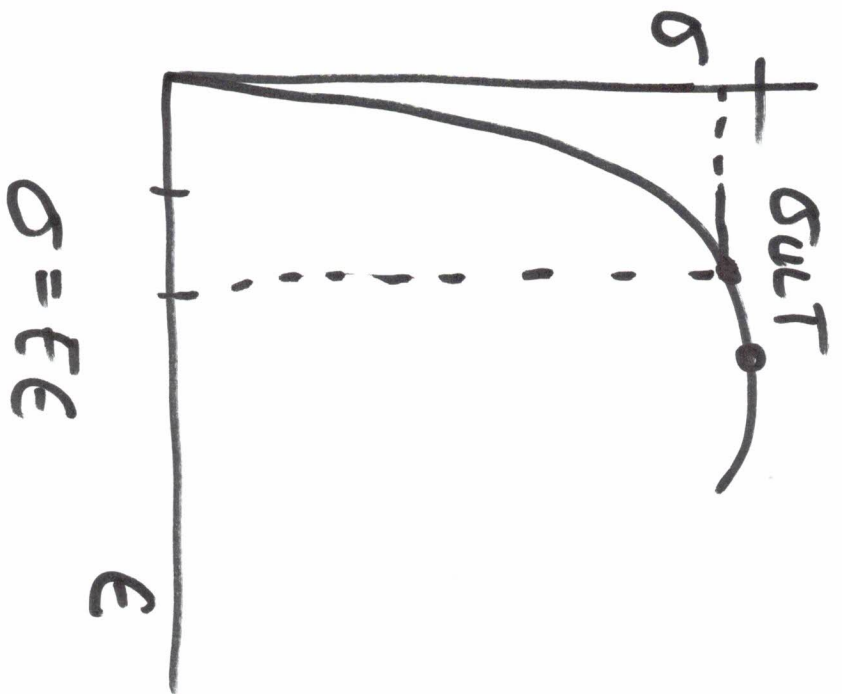


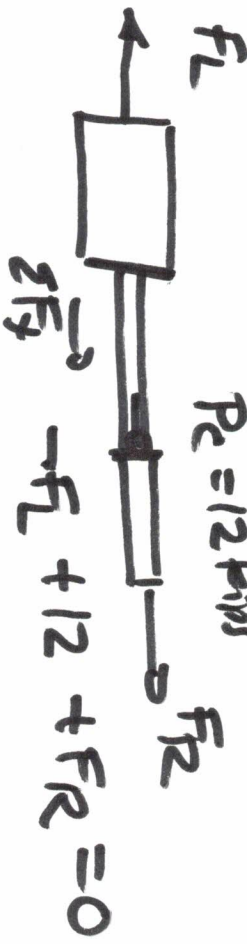
$$\Delta L_2 = \epsilon_2 L_2$$

$$\frac{\Delta L_2}{50} = \frac{\Delta L_1}{90}$$

$$\epsilon_1 = \frac{\Delta L_1}{L_1}$$

$$\epsilon = \frac{\Delta L}{L_0}$$





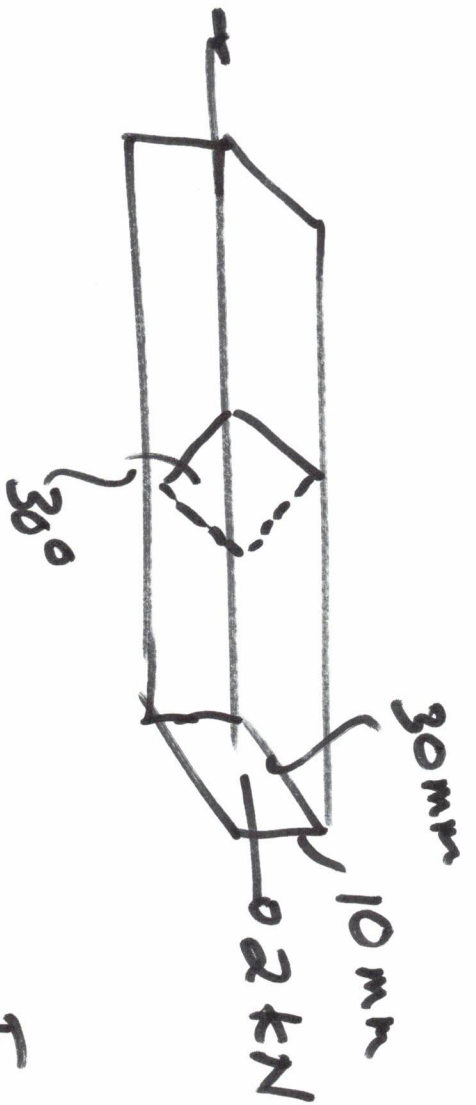
$$P_c = 12 \text{ kips}$$

$$\sum F_x \rightarrow -F_L + 12 + F_R = 0$$

2 unknowns, 1 eqn
 statically indeterminate

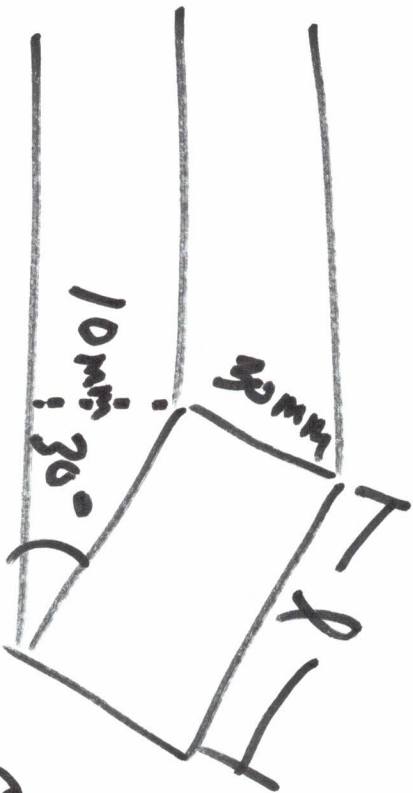
EXAM I:

- statics structure problem
- stress on incline / plane
- $\sqrt{\quad}$ σ - ϵ curve
- \underline{uR}
- 3-D Hooke's Law



$$F_H = 2 \text{ kN} \sin 30^\circ$$

$$F_S = 2 \text{ kN} \cos 30^\circ$$



$$A_{me} = 30 \text{ mm} \cdot P$$

$$\sin 30^\circ = \frac{10}{P}$$

$$P = \frac{10}{\sin 30^\circ} \text{ mm}$$

$$\sin \alpha = \frac{F_H}{A_{me}} \quad \tan \alpha = \frac{F_S}{A_{me}}$$

