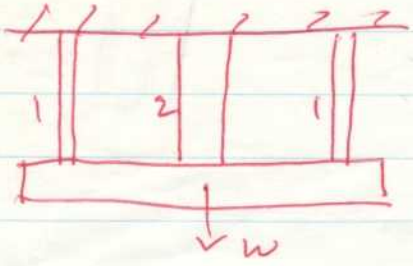


	1	2	
E	30	15	$\times 10^6$ psi
σ_0	100	60	$\times 10^3$ "
A	1	2	sq in
L	10	10	in

kinematic $\delta_1 = \delta_2 = \delta \rightarrow \epsilon_1 = \epsilon_2 = \epsilon = \frac{\delta}{L}$

equil : $W = 2\sigma_1 A + \sigma_2 A = 2(\sigma_1 + \sigma_2)$

IF elas $\sigma_1 = E_1 \epsilon \qquad \sigma_2 = E_2 \epsilon$

$$\frac{\sigma_2}{\sigma_1} = \frac{E_2}{E_1} = \frac{15}{30} = \frac{1}{2}$$

$$\sigma_1 = 2\sigma_2$$

(equil) : $W = 2(2\sigma_2 + \sigma_2) = 6\sigma_2$

$$\sigma_2 = \frac{W}{6} \qquad \sigma_1 = \frac{W}{3}$$

since in elas range $\sigma_1 = 2\sigma_2$ or $\sigma_2 = .5\sigma_1$

and $\sigma_{0_2} = .6\,\sigma_{0_1}$

σ_1 will reach 100000 psi when σ_1 is 50000 psi

∴ member 1 will reach yield first
at the strain $\epsilon = \frac{\sigma_{01}}{E_1} = \frac{100000}{30000000} = 0.00333$
at the load $W^e = 2(100000 + 50000) = 300000$ lb

In the partially plastic regime,

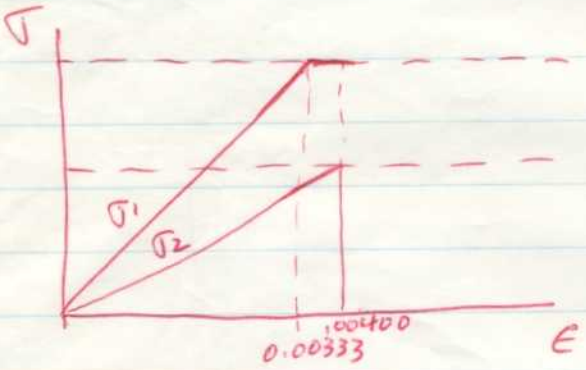
$$\sigma_1 = \sigma_0 \quad \text{and} \quad \sigma_2 = \epsilon E_2$$

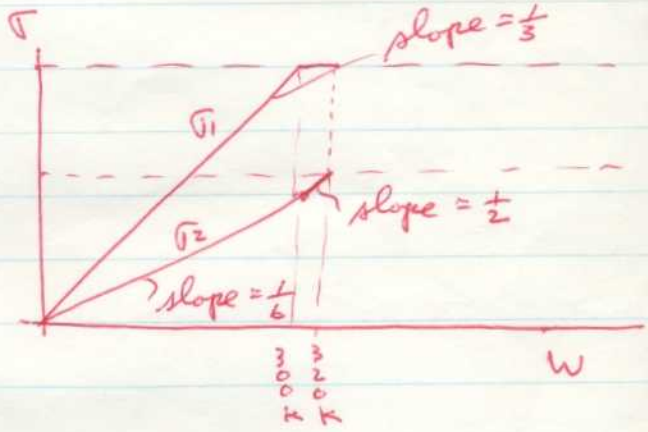
$$\text{or} \quad W = 2(\sigma_{0_1} + \sigma_2) = 2\sigma_{0_1} + 2(15\times10^6)\epsilon$$
$$= 200000 + 30\times10^6\epsilon$$

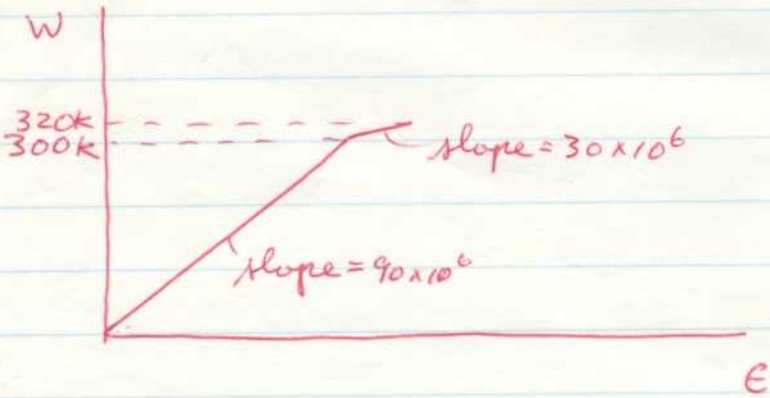
in the limit, $\sigma_2 \to 60000$

$$\text{and} \quad W^0 = 2(100000 + 60000) = 320000 \text{ lb}$$

$$\epsilon^0 = \frac{60000}{15000000} = 0.004$$







when ① is at yield,

$$N_1 = N_0 = \sigma_0 A$$

and $F^{\circ} = N_0 + 2N_2 \cos\alpha$

$= \sigma_0 + 2\sigma_2 A$