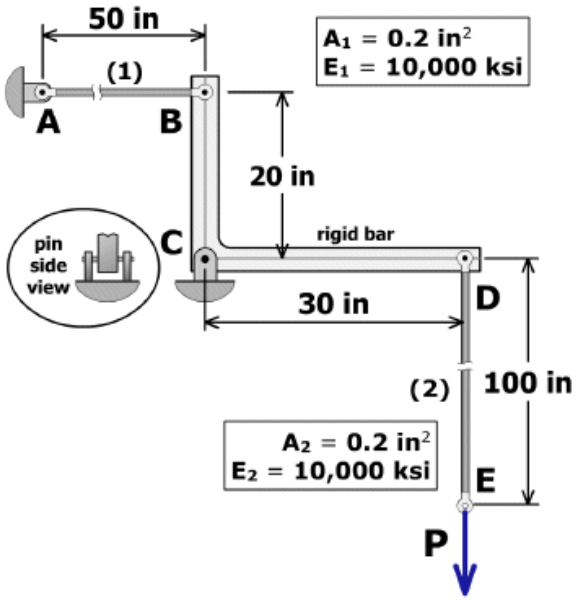
IDE 110 – Summer 2006 Quiz 4 **Name:** _____

Rigid bar BCD is supported by a pin at C and by rod (1). There is no strain in the bars (1) and (2) before load P is applied. If the axial strain in rod (1) is 1,000 μin/in after load P is applied, determine:

a. the change in length of rod (1)
b. the stress in rod (1)
c. the force in rod (1)
d. the magnitude of load P
e. the stress in rod (2)
f. the strain in rod (2)
g. the change in length of rod (2)
h. the distance point D moves downward
i. the distance point E moves downward
j. Kermit the Frog's middle name

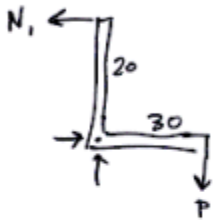
(be sure to include units and box answers)



a) $\delta_1 = \varepsilon_1 L_1 = 1000(10^{-6})(50) = \boxed{0.05 \text{ in}}$

b) $\sigma_1 = E_1 \varepsilon_1 = 10(10^6)(1000 \times 10^{-6}) = \boxed{10{,}000 \text{ psi} = 10 \text{ ksi}}$

c) $N_1 = \sigma_1 A_1 = 10000(0.2) = \boxed{2000 \text{ lb}}$

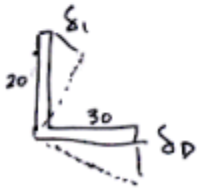


d) $P = \frac{20}{30} N_1 = \boxed{1333 \text{ lb}}$

e) $\sigma_2 = \frac{N_2}{A_2} = \frac{1333}{0.2} = \boxed{6667 \text{ psi} = 6.67 \text{ ksi}}$

f) $\varepsilon_2 = \frac{\sigma_2}{E_2} = \frac{6667}{10(10^6)} = \boxed{666.7 \ \mu}$

g) $\delta_2 = \varepsilon_2 L_2 = 666.7(10^{-6})(100) = \boxed{0.067 \text{ in}}$



h) $\delta_D = \frac{30}{20} \delta_1 = \frac{30}{20}(0.05) = \boxed{0.075 \text{ in}}$

i) $\delta_E = \delta_D + \delta_2 = \boxed{0.142 \text{ in}}$