Grading Comments on TAM 202 HW #9, April 11, 2001

(1) Total pts – 10 pts (2.34, 2.66, 2.68, 2.86 – 1 pt
2.38, 2.48, 2.64 – 2pts)

(2) Common Errors :

① Problem 2.38 , This problem is statically indeterminate. One should use the constraint $\delta_{total} = 0$ to solve the unknown reaction at A or E. (there is only one independent unknown force, so we only need one equation $\delta_{total} = 0$!). $\delta_{total} = \delta_{AB} + \delta_{BC} + \delta_{CD} + \delta_{DE}$
The reason we need to compute δ of each portion is because force in each portion (or cross section) is different. Those forces F_{AB}, F_{BC}, F_{CD} and F_{DE} can be determined by drawing FBDs. as shown in solutions. Also, they are related to reaction at A (or reaction at E). Using $\delta_{total} = 0$, one can finally find R_A (or R_E) and the amount of deformation δ at C by summing $\delta_{AB} + \delta_{BC}$.

② Problem 2.48 : Again, this problem is statically indeterminate, we need the kinematics of δ_A, δ_C and δ_D to give the extra eq to solve T_{BC} and T_{DE}. See solution for details.

③ Problem 2.64 : There is no stress associated with the strain (or deformation) due to temperature change. In orther words, the total deformation of each rod is consist of two parts: one is due to stress in rod (caused by reaction at ends) and the other is due to temperature. i.e., $\delta = \delta_\sigma + \delta_T$, $\delta_\sigma = \frac{\sigma L}{E}$
$\delta_T = \alpha \Delta T L$. But, remember σ in AB and CD are different. However, $F_{AB} = F_{CD} = \sigma_{AB} \cdot A_{AB}$ and is equal to reaction at ends.