Assignment #2 is an individual assignment to be submitted in draft form the week before the concrete cylinder experiment and in final form the week after the concrete cylinder experiment. For draft calculations, use values of assumed $f_c'$ and $E_c$ as stated in lab. The yield strength will be given by the instructor based on rebar tests (not performed by the student).

1. Assignment #2 requires students to calculate the NA depth, $c$, and moment of inertia, $I$, for the uncracked and cracked sections of their reinforced concrete beam. Students should reference the mini-lectures available on the website.

2. Calculate the modular ratio, $n$. Use the average experimental value of $E_c$ to calculate the modular ratio. $E_s=29,000,000$ psi. The modular ratio, $n$, is defined as: $n = E_s / E_c$.

3. **Uncracked Section:** Transform the steel to equivalent concrete to obtain the transformed section and use statics to determine the uncracked transformed moment of inertia, $I_{tr}$. You will first need to determine the location of the neutral axis with the area of steel, $A_s$, replaced with the equivalent area of concrete, $(n-1)A_s$. $I_{tr}$ applies to sections before first flexural cracking.

4. **Cracked Section:** Calculate the cracked moment of inertia, $I_{cr}$, which assumes the concrete in tension has cracked. You will first need to determine the location of the neutral axis with the area of steel, $A_s$, replaced with the equivalent area of concrete, $nA_s$ (not $(n-1)A_s$). Compared to the uncracked section, the NA depth is significantly reduced, as is $I_{cr}$. An effective $I$, $I_e$, can be calculated to determine deflections prior to yielding of the steel.

5. Prepare a table with the values of: $f_c'$ (ave), $E_c$ (ave), $n$, $I_{tr}$, $c_{cr}$, $I_{cr}$.

6. Prepare a very neat version of your calculations, with initials of one teammate placed at the end of each major calculation, verifying the values are correct. These calculations will go into the Appendix of your formal report.