**CE 160: Structural Design**  
**Spring 2002**  
**Recitation Assignment #2**  
**Due: 01/31/02**

**Topic: Flexural Analysis and Design of a Singly Reinforced Concrete Beam**

**Given:**

\[ f'c = 5000 \text{ psi} \]

\[ fy = 60 \text{ ksi} \]

\[ E_s = 29000 \text{ ksi} \]

Simply supported span \( L = 15 \text{ ft} \)

---

**Problem 1** – determine the nominal flexural strength, \( M_n \), and maximum allowable design strength, \( M_u \) of the beam.

**Problem 2** – In addition to its own weight is the beam sufficient to carry a nominal dead load of 1.5 k/ft and a nominal live load of 3.0k/ft?

**Problem 3** – If the beam does not have enough capacity to carry the load specified in part 2, determine the required tensile steel area and select the needed rebars for the load. Assume the geometry of the section does not change.

**Problem 4** – does the new section satisfy the ACI Code requirements for maximum and minimum reinforcement ratios?