ENDS 231. Assignment #7

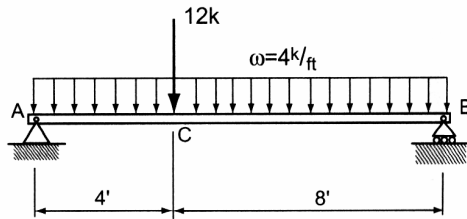**Date:** 3/4/08, *due 3/18/08*   *Pass-fail work*

Problems: from Onouye, Chapters 8 & 6.
*Note: Problems marked with a * have been altered with respect to the problem stated in the text.*

Construct the load, shear, and moment diagrams for the fol-
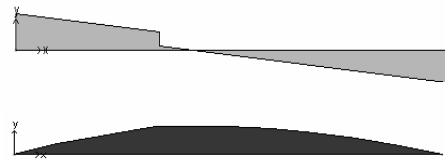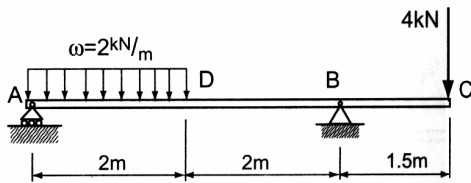lowing beam conditions using the semi-graphical method.

(25%) **8.4.3**

Partial answers to check with:
$V_{max} = +32\ k,\ M_{max} = 98^{\ k\text{-}ft}$

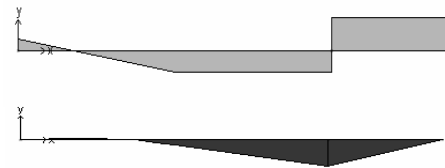*Problem 8.4.3*

(25%)***8.4.5**

Partial answers to check with:
$V_{max} = +4\ kN,\ M_{max} = -6^{\ kN\text{-}m}$

Problem 8.4.5

(10%)   ***Also verify your work for problem 8.4.5 using Multiframe4D. You will be given a standard steel section to use. Submit the file to the Assignments folder in the class folder, and provide a print of the diagrams.**
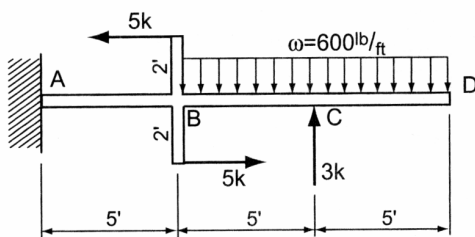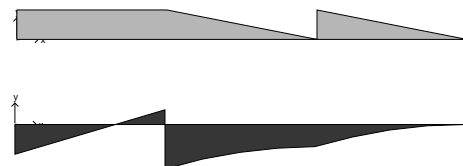
(25%) **8.4.7**

Partial answers to check with:
$V_{max} = +3\ k,\ M_{max} = -15^{\ k\text{-}ft}$

Problem 8.4.7

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(10%) ***Use metric units.**

6.1.3   A steel column carries a building load of 75 k (334 kN) to a 14" × 14" (356 mm × 356 mm) base plate that is bolted to a concrete footing pad that measures 1 foot (305 mm) in thickness. The column has a cross-sectional area $A = 11.7$ in.^{2} ($A = 7580$ mm^2 = 7.58×10^{-3} m^2). Determine the following:

Problem 6.1.3

a. the average compressive stress developed in the W8 × 40 (W200 × 59) column
b. the bearing stress between the steel base plate and the concrete footing
c. the footing size, assuming that the allowable soil bearing pressure is $q = 4$ ksf (191 kPa) and the density of concrete is 150 pcf $\left(2400 \,^{kg}\!/_{m^3} = 23.6 \,^{kN}\!/_{m^3}\right)$

(axial, shear, and bearing stress)

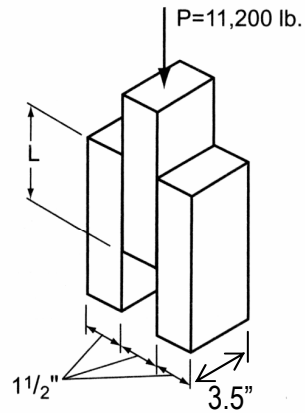*Partial answers to check with: a) 44.1 MPa,*
b) 2.64 MPa, c) x = 1.35 m
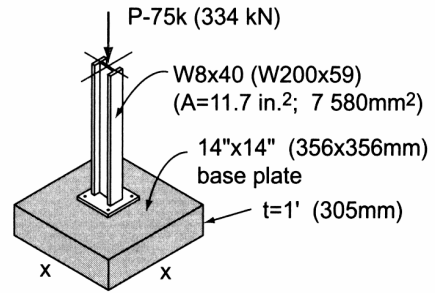
(5%) **6.1.7**   Three 2×4 S4S blocks are glued together as shown. Assuming the glue has a shear capacity of 80 psi, determine the minimum length L required. *(axial, shear, and bearing stress)*

Partial answers to check with: L = 20 in.

Problem 6.1.7

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