ENDS 231. Assignment #8

Date: 6/22/06, *due 6/28/06* *Worth 25 pts.*

Problems: from Onouye, Chapters 9 & 10.
*Note: Problems marked with a * have been altered with respect to the problem stated in the text. Mutiframe 2D may be used.*

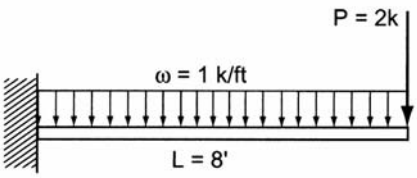
***Use A992 steel, LRFD design method and the beam diagram to select a W10 (fully braced) knowing the distributed load is dead load and the point load is a live load.**
F_y = 50 ksi, F_{vw} = 50 ksi, E = 30,000 ksi, γ_L = 1.6, γ_D = 1.2, ϕ_b = 0.9, ϕ_v = 0.9

9.1.21 Assuming ~~A36~~ steel, select the most economical ~~W8~~ section. Check the shear stress and determine the deflection at the free end.

~~$F_b = 22$ ksi~~

~~$F_v = 14.5$ ksi~~

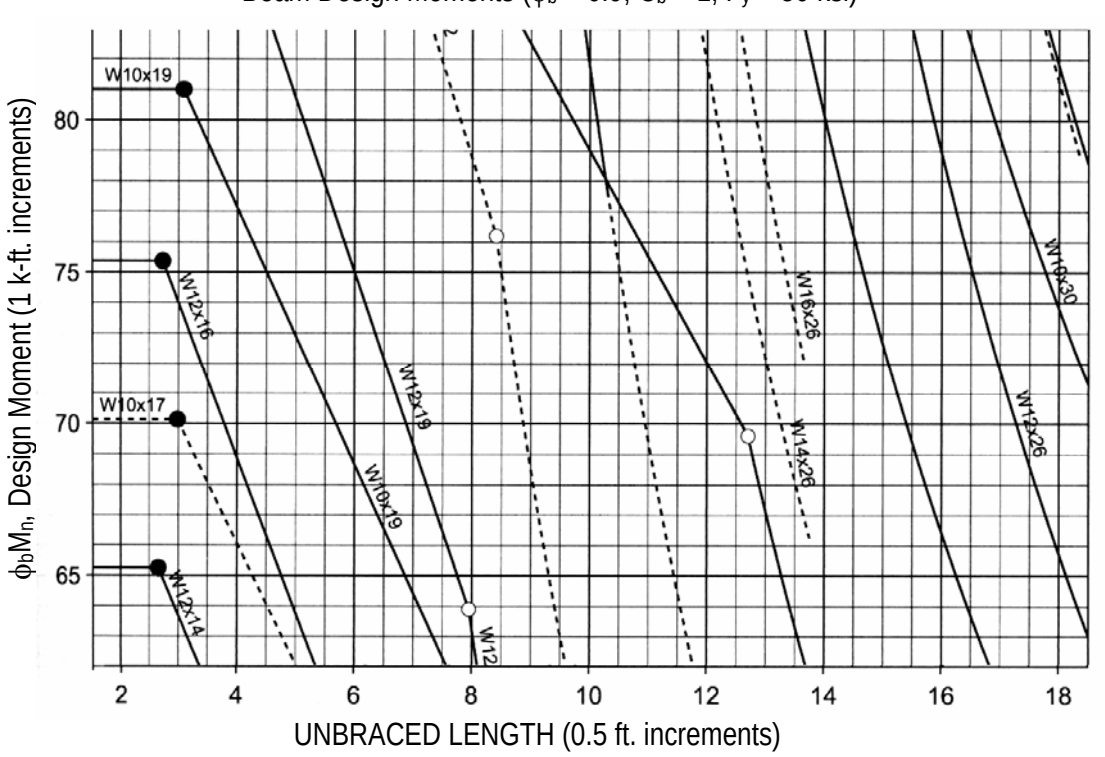
~~$E = 29 \times 10^3$ ksi~~



Problem 9.1.21

Partial answers to check with:

LRFD design: M_u = 77.4 k-ft, V_u = 14 k, ϕV_n =69.1 k, Δ =0.79 in



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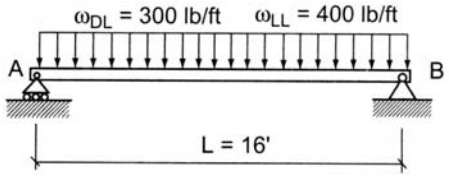
9.1.22 Design a Douglas fir–larch No. 1 beam to support the load shown.

$F_b = 1300$ psi

$F_v = 85$ psi ***$\gamma \approx 32$ lb/ft^3 for Douglas fir**

$E = 1.6 \times 10^6$ psi

$\Delta_{allow(LL)} = L/360$



Problem 9.1.22

Partial answers to check with:

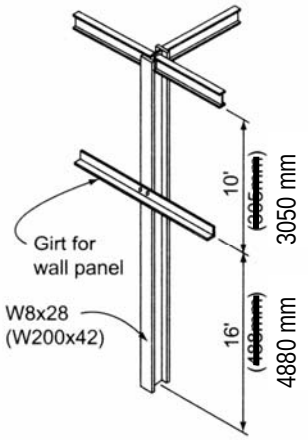
$S_{x\text{-}req'd} = 207$ in.^{3}, $A_{req'd} = 99$ in^2., Self weight ≈ 22.5 lb/ft and new $S_{req'd} \approx 214$ in^3, $A_{req'd} \approx 103$ in^2. $\Delta_{(LL)} = 0.2$ in.

***Use metric units.**

10.2.6 Determine the critical buckling load and stress for the W8×28 (*W200x42*) column shown. $E = 29 \times 10^3$ ksi ($E = 200 \times 10^3$ *MPa*). ***1 MPa = N/mm^2**

Partial answers to check with:

$L_e/r_x = 90.5$ and $L_e/r_y = 118.7$, $P_{cr\text{-}x} = 1281$ kN, $P_{cr\text{-}y} = 748$ kN, $f_{cr} = 141$ MPa



Problem 10.2.6

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