

HW 3**Reading:**

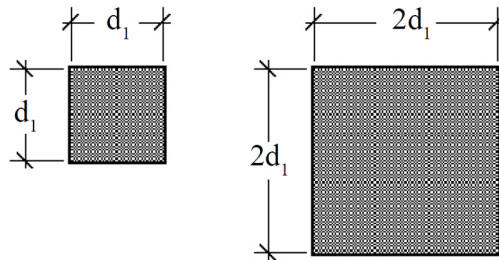
Read Chapters E of the Spec and table 4-22 (AISC Steel Manual Spec on website)

Problem 1

An unbraced pin-ended A36 steel column has rectangular cross-sectional dimensions of 3 in \times 2 in and is 25 ft long. What is the tension capacity? What about compression, that is, what is the critical Euler buckling load, P_{cr} or P_e for this column? You will need the following info to answer ...E, I_x , I_y . Assume A36 steel. We did this in class.

Problem 2

Assume that a pin-ended column of length L has a square cross section of dimensions $d_1 \times d_1$ and has a critical buckling load of P_1 . What is the relative increase in load-carrying capacity if the cross-sectional dimensions of the column are doubled? Assume A36 steel. (Hint: try using excel to make calc easier)

**Problem 3**

An unbraced steel column of rectangular cross section 1.5 in. \times 2 in. and pinned at each end is subjected to an axial force. Assume A36 steel. Find the transition point between short- and long-column behavior (by setting $P_{max} = A F_y = P_e$).

Problem 4

What is a AISC code LRFD compression capacity of a W14x120 column, 20ft long with pinned ends ($k=1$)? (Hint: See AISC 14 Ed Design Example E1.A, table will provide answer or use Table 4-22 PDF)

Problem 5

Calculate the ASD and LRFD available strength of a W14x99 column with an unbraced length of 30ft. (Hint: See AISC 14 Ed Design Examples E.1C, same but different shape and use the Table 4-22 PDF. Remember you already have the PDF of the members)