CE 311 Celebration of Knowledge 2  
September 25, 2013

You are allowed to have the AISC manual, pencils, and a calculator, only

**Bonus Questions (0.1 points, each)**

1. From the 1920’s to about World War II, Lafayette College Football was considered to be a member of the “Little Three”. Name the other two schools in that group.

2. Name the Lafayette College President who preceded Daniel Weiss.

3. Name Lafayette College’s First President.

4. Spell the complete name of Lafayette College’s current President (spelling counts).

5. What is the name of Lafayette College’s yearbook?

6. Name the member of the Lafayette Class of 1952 who served as the Secretary of the Treasury of the United States from 1974 to 1977.
1. (4 points). TRUE or FALSE. If all of the applied loads are dead loads, the LRFD method will generally require larger member sizes than the ASD method.

2. (4 points) TRUE or FALSE. The ASD method will lead to the selection of larger (stronger) members than LRFD when live loads are relatively high and dead loads are relatively low.

3. (8 points) For the plane shown, what is the theoretical $K$ value for column AB? Given: Fixed base (foundation), rigid (moment-resisting) column-girder connections. Girder is W16x26. Column is considered to have infinite $EI_x$.

4. (8 points) For the plane shown, what is the theoretical $K$ value for column AB? Given: W12x40 columns, W24x103 girder, pinned base (foundation), simple (non-moment-resisting) column-girder connections.
5. (8 points) For which frame (Circle either I or II) would the columns have higher nominal buckling load $P_n$? Given: both frames are identical rigid frames with pinned bases, but Frame I has a 12' span and Frame II has a 24' span.

![Frame Diagram]

6. (8 points) What is the nominal buckling strength $P_n$ of column AB? Given: Two views of the frame are shown. W12x40 columns, W24x103 girder, pinned base (foundation), simple (non-moment-resisting) column-girder connections. $F_y=50$ ksi for all.
7. (60 points). Determine the nominal buckling strength $P_n$ of the 12-ft-long axially loaded columns in the rigid frame, shown. Use exact K-values.

Given: All beam-column-connections are moment-resisting (rigid). The foundations are pinned. All members are Hollow Rectangular Tubes that are 12” deep, 4” wide, with a 5/8” wall thickness, with properties as follows:

- $F_y = 50$ ksi
- $I_x = 245 \text{ in}^4$
- $I_y = 40.4 \text{ in}^4$
- $r_x = 3.87 \text{ in}$
- $r_y = 1.57 \text{ in}$
- $A = 16.4 \text{ in}^2$

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<table>
<thead>
<tr>
<th>Slenderness Type</th>
<th>Equation</th>
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<tbody>
<tr>
<td>x-x Slenderness</td>
<td>(KL/r)_x = [value]</td>
</tr>
<tr>
<td>y-y Slenderness</td>
<td>(KL/r)_y = [value]</td>
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</tbody>
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Nominal Buckling Load:

\[ P_n = \text{[value]} \text{kips} \]