

# MAE 415 – Analysis of Structures

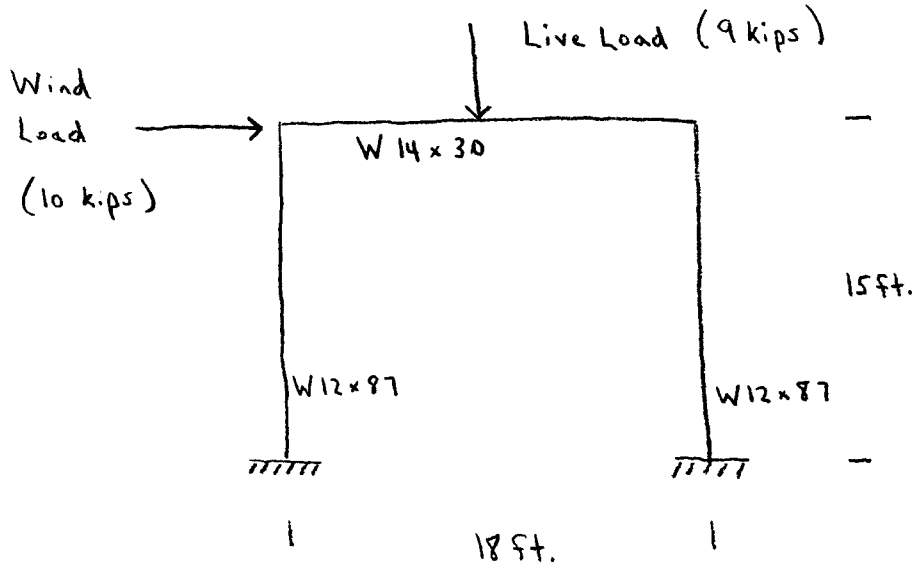
Instructors: Bloebaum/Hulme

Assignment #12

Due date: 12/1/00, BEFORE class begins

Class web page: <http://www.eng.buffalo.edu/~clb/mae415.html>

1. For Assignment #10, you analyzed a simple 2D portal frame in the *VisualAnalysis* software package. Now that you have been exposed to beam finite element theory, it will be beneficial to re-analyze the structure (with *similar* loading conditions) **by hand**. In so doing, you can verify your previous results.



(Note: 1 kip = 1000 lbf.)

$E = E$  (1040 steel)

- Discretize the structure into an appropriate number of finite elements. Comment on your procedure for doing so.
- Assemble your element stiffness matrices, based on the shape function formulations we derived in class previously.
- Assemble the system stiffness matrix.
- Utilize all known information (i.e. BC's and applied loads) to your advantage. Comment on your procedure for doing so.
- Solve for the unknown forces and displacements **by hand**.
- Re-analyze this structure in *VisualAnalysis*. Obtain a few pages of tabular/graphical printouts which verify the values obtained from your hand calculations. (Note: Because the loading conditions aren't exactly the same, the numbers might differ slightly.)