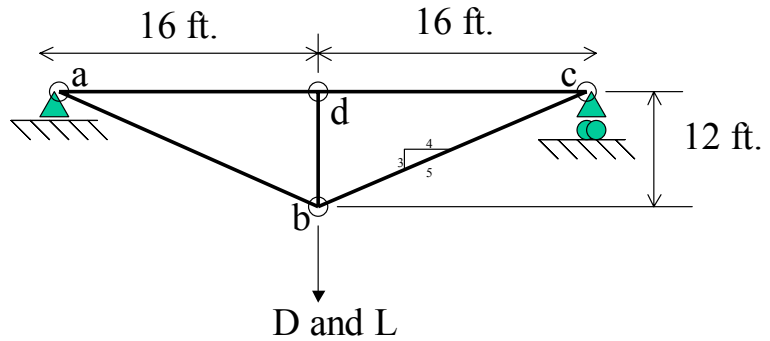


(15 points) 1. Load Combinations

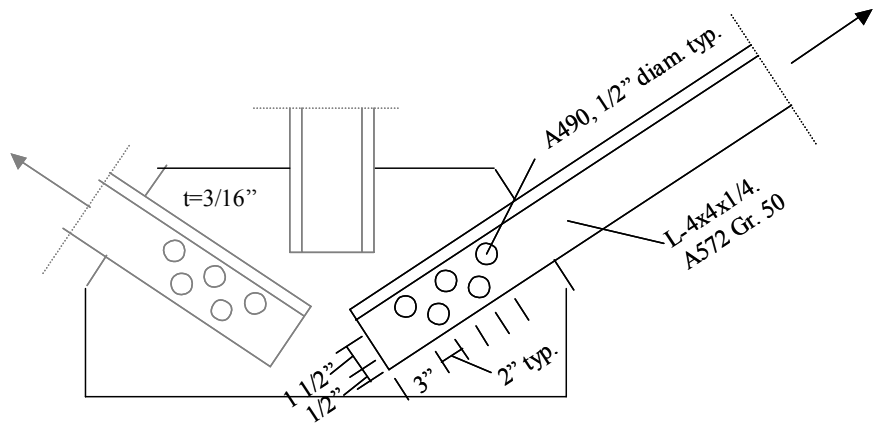
This simple truss is loaded by a dead load (D) of 35 kips and a live load (L) of 3.5 kips as shown. Determine the factored loads in members bc and dc.



(40 points) 2. Tension Member

Consider the connection detail for member bc at end b, as shown.

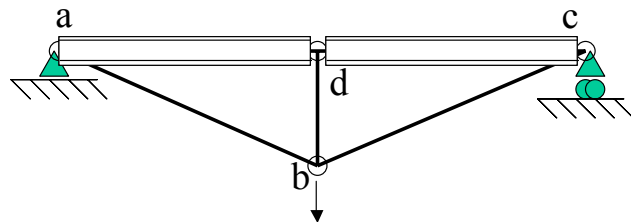
- List all possible modes of failure for this connection.
- Calculate the tension capacity, consider only yielding in the gross section, fracture in the net section, and bolt shear - ignore all other failure modes.
- Based on the checks in (b) is the member adequate?



(30 points) 3. Compression Member

Consider member dc, an A36 I-beam ($I_x=140\text{in}^4$, $I_y=50\text{in}^4$ and $A=11\text{in}^2$) with the web in the plane of the truss, as shown. Also, assume the pins at a and c provide a pinned support for both in and out of plane movement.

- Determine the slenderness (KL/r) for buckling of member dc. (Consider buckling both in, and out of the plane of the truss.)
- Calculate the capacity of member dc.
- Is the member strength adequate?



(15 points) 4. Short Answer

Is the selected truss design (tension member/connection, and compression member) efficient? why/why not? If not, what would you change?