To do ...

- Happy Mid-Autumn festival

- HW 11 ME due Thurs

- CATME mid-course survey due Fri

- HW 12 PL due Tues
Main goals and learning objectives

- Determine the forces in members of a truss using the method of joints
- Determine zero-force members
- Determine the forces in members of a truss using the method of sections
Simple trusses

Trusses are commonly used to support roofs.

A more challenging question is, that for a given load, how can we design the trusses’ geometry to minimize cost?
Scaffolding

An understanding of statics is critical for predicting and analyzing possible modes of failure.

Buckling of slender members in compression is always a consideration in structural analysis.
Simple trusses

**Truss:**
- Structure composed of slender members joined together at end points
- Transmit loads to supports

**Assumption of trusses**
- Loading applied at joints, with negligible weight (If weight included, vertical and split at joints)
- Members joined by smooth pins

**Result:** all truss members are two-force members, and therefore the force acting at the end of each member will be directed along the axis of the member
Roof trusses

Load on roof transmitted to purlins, and from purlins to roof trusses at joints.

Bridge trusses

Load on deck transmitted to stringers, and from stringers to floor beams, and from floor beams to bridge trusses at joints.
Truss joints

- Bolting or welding of the ends of the members to a gusset plates or passing a large bolt through each of the members
- Properly aligned gusset plates equivalent to pins (i.e., no moments) from coplanar, concurrent forces
- Simple trusses built from triangular members
Method of joints

- Truss is in equilibrium ONLY if ALL individual pieces are in equilibrium
- Truss members are two-force members: equilibrium satisfied by equal, opposite, collinear forces

Procedure for analysis:
Find the forces in each member of the truss. Determine if members are in tension or compression.
Zero-force members

- Particular members in a structure may experience no force for certain loads.
- Zero-force members are used to increase stability.
- Identifying members with zero-force can expedite analysis.
Find the forces in each member of the truss.