Given Information:
For Steel, E = 29000 ksi, G = 11200 ksi

Bonus Questions (0.1 points)

1. There is a student in this class whose name is “Mahmoud.” Spell his last name (credit not given if your name is “Mahmoud”)

2. What Irish political movement is named after a phrase meaning "we ourselves’’?

3. What physicist's last words were not understood because his nurse did not speak German?

4. What country used weather-born balloons to drop more than a hundred bombs on North America during World War II?

5. What country developed an incendiary bombing system during world war II in which tiny incendiary bombs were tied to the feet of bats that were kept in hibernation until the bomb reached a specific target altitude?

6. What's the Islamic Resistance Movement better known as to Palestinians?

7. What war lasted from June 5, 1967 to June 10, 1967?

8. What Polish political movement got the support of Pope John Paul II in the 1980s?

9. Who is credited with inventing the movable type printing press?

10. What strategic group of islands did Portugal allow Britain to access during World War II?
1. (15 points) The beam shown is an A992 W21x55 beam in strong-axis bending, with a uniform \( w \) as shown. Use ASD specifications to determine the maximum safe load \( w \) that may be applied if the beam is 6 feet long with braces at the ends, only. Assume that deflection is not a consideration.
2. (25 points) Given: simple braced 2-bay frame (i.e., non-moment-resisting beam-column connections). The beams are subjected to a uniformly distributed dead load \( w_D = 1 \text{ klf} \) (this includes the beam self-weight) and a live load \( w_L = 1 \text{ klf} \). The simple beam-column connections are made such that the horizontal distance from the bolts to the centerline of the column is 7", as shown.

Circle all of the correct answers:

a. Using ASD, Column AB is subjected to \( P = 30 \text{ kips (compression)} \) and \( M = 210 \text{ kip-in in strong axis bending where the bending causes compression on the righthand side of the member.} \)

b. Using ASD, Column CD is subjected to \( P = 30 \text{ kips (compression)} \) and \( M = 0 \text{ kip-in.} \)

c. Using ASD, Column AB is subjected to \( P = 30 \text{ kips (compression)} \) and \( M = 210 \text{ kip-in in strong axis bending where the bending causes compression on the righthand side of the member.} \)

d. Using ASD, Beam BC is subjected to \( M = 210 \text{ kip-in in strong-axis bending where the bending causes compression on the top of the beam.} \)

e. \( KL_x \) for member AB cannot be determined from the given information.

f. \( KL_x \) for member EF is 32 feet

g. If column AB is compact, then it is known that the controlling limit state for bending is lateral-torsional buckling. With \( L_b \) equal to 15 feet.

h. Column EF is considered unbraced.
3. (25 points). Use ASD specifications to select an A36 solid round member to be used as a brace between column lines 2 and 3, along column line A. Specify minimum rod diameter that is needed, then round up to the nearest 1/8".

**Given:** The exterior walls consist of metal studs that span vertically between the foundation and the roof, which acts as a diaphragm. All connections between steel framing are considered simple pins. The bracing is assumed to be tension-only braces (hence, they are redundant).

- Wind is blowing from East to West. The code-specified Ultimate Wind pressure is 33.3 psf, but because the ASD factor on wind is 0.6, this means that the ASD design wind pressure is 20 psf.
4. (35 points) Determine the maximum axial compression $P$ that may be safely applied per ASD to the A992 W10x45 shape. Second order effects: assume that the second order moment magnifier $B_1$ is 1.05.

**Given**: The 30'-long A992 W10x45 shape is simply supported with continuous bracing along the length that prevents lateral movement (i.e., in and out of the page). It is subjected to strong-axis bending due to a uniformly distributed load $w=1$ kip/ft, which already includes self-weight. It is also subjected to axial compression.

![Diagram of the A992 W10x45 shape with continuous bracing and uniformly distributed load](image)

Given:
- $w = 1$ kip/ft
- Continuous lateral bracing
- W10x45
- 30 - feet

Calculate the maximum axial compression $P$. Use the appropriate formulas and tables from the AISC Standards.