Announcements

- TAM 210/211 students – check your grades on Compass

- Upcoming deadlines:
  - Friday (3/15)
    - PL HW 8
    - Written Assignment
Objective

- Relations among external load (distributed force, concentrated force, couple moment) and internal load (shear force and bending moments)
Relationships between $w$, $V$, $M$

Draw the shear and moment diagrams for the beam.
Wherever there is an external concentrated force, there will be a change (jump) in internal shear force.
Relations Among Load, Shear and Bending Moments

Wherever there is an external couple moment, there will be a change (jump) in internal bending moment.
Relationship between load and shear:

\[ \sum F_y = 0: \quad V - (V + \Delta V) + w \Delta x = 0 \]

\[ \Delta V = w \Delta x \]

Dividing by \( \Delta x \) and letting \( \Delta x \to 0 \), we get:

\[ \frac{dV}{dx} = w \quad \Delta V = \int w \, dx \]
Relations Among Load, Shear and Bending Moments

Relationship between shear and bending moment:

\[ \sum M_0 = 0: \quad (M + \Delta M) - M - V \Delta x - w \Delta x (k \Delta x) = 0 \]

\[ \Delta M = V \Delta x + w k (\Delta x)^2 \]

Dividing by \( \Delta x \) and letting \( \Delta x \to 0 \), we get:

\[ \frac{dM}{dx} = V \quad \Delta M = \int V \, dx \]
Example

Draw the shear and moment diagrams for the beam.
Example

Draw the shear and moment diagrams for the beam.
Example

Draw the shear force and bending moment diagrams for the beam.