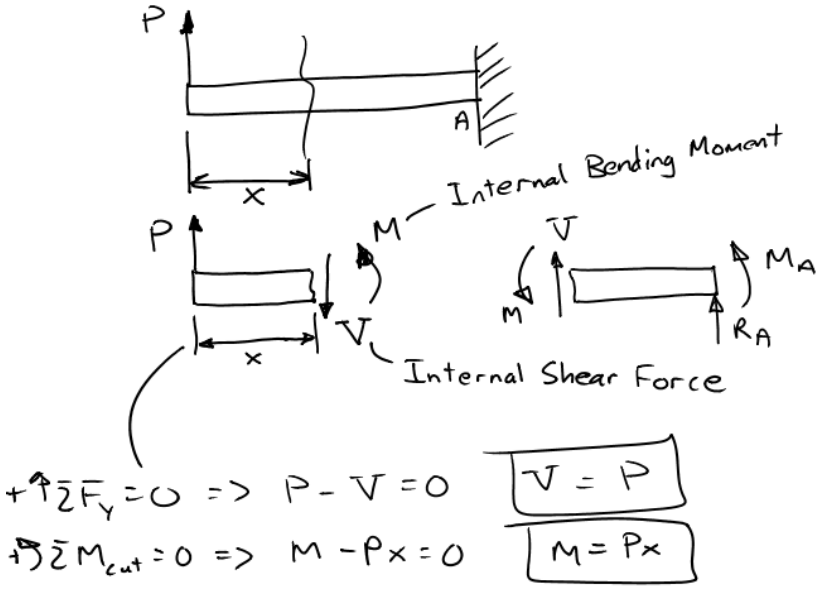
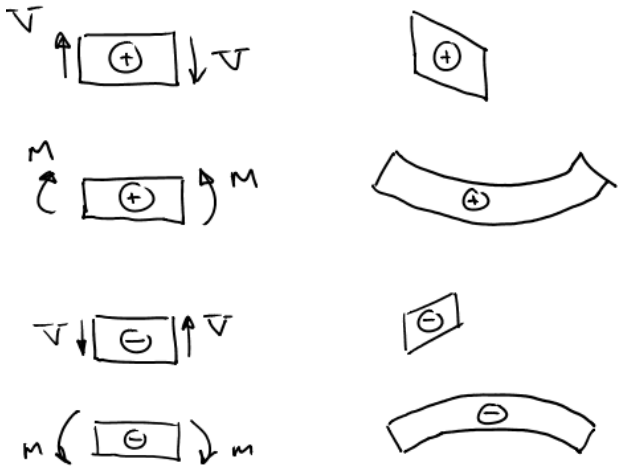
ENGR 2243 – Mechanics of Materials
Shear and Bending Moment Diagrams

Shear Forces and Bending Moments

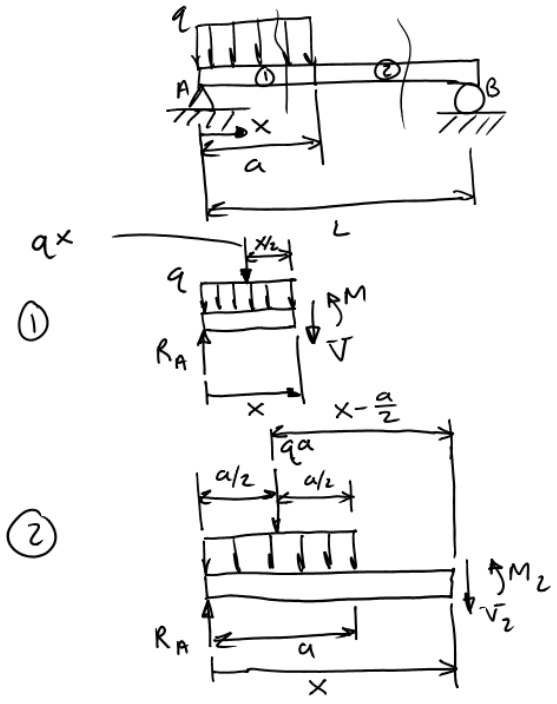


- Sign Convention
    - Always assume a positive sign convention when determining shear forces and bending moments

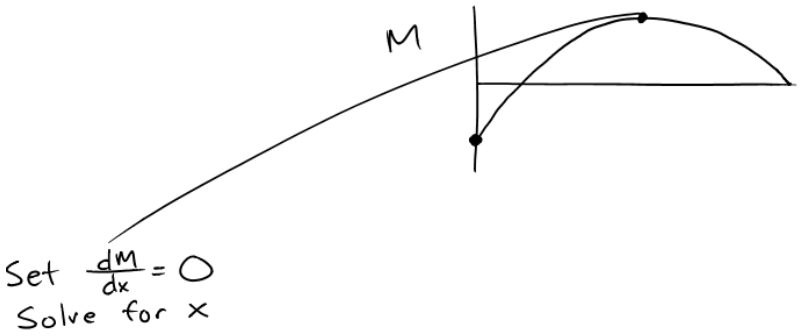


Shear and Bending Moment Diagrams
- Graphs that show the distribution of shear force and bending moment along the length of the beam
- Show the min and max values of shear force and bending moment
- Need to find the functions for shear force and bending moment for each segment of the beam

- Distributed Loads



- Determining the min and max values for bending moment



- Relationship between loading, shear force, and bending moment

$$V = \frac{dM}{dx} \Rightarrow M = \int V dx$$ (Area under the shear force diagram)

$$-q = \frac{dV}{dx} \Rightarrow V = -\int q dx$$ (Area under the load intensity diagram)

Load	Shear	Moment
Concentrated Load	Jump at the load Load ↓ => Shear ↓ " ↑ => " ↑	Linear
Couple Moment	Constant	Jump ↻ => Jump Down ↺ => Jump Up
Uniform Distributed Load	Linear	Quadratic
Linear Distributed Load	Quadratic	Cubic