

Elementary Statics

Equation Sheet #5: Shear and Moment Diagrams, Dry Friction, and Area Moments of Inertia

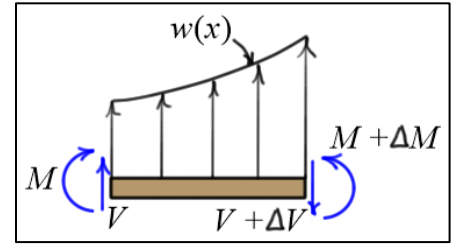
Shear Force and Bending Moment Diagrams

$$\frac{dV}{dx} = w(x)$$

$$\Delta V = \int w(x) dx \quad \left\{ \begin{array}{l} \text{Change in shear force} = \\ \text{Area under the load diagram} \end{array} \right.$$

$$\frac{dM}{dx} = V(x)$$

$$\Delta M = \int V(x) dx \quad \left\{ \begin{array}{l} \text{Change in bending moment} = \\ \text{Area under the shear diagram} \end{array} \right.$$



Dry Friction

$$f_{\max} = \mu_s N$$

μ_s is the *coefficient of static friction*

$$f_{\text{dyn}} = \mu_k N$$

μ_k is the *coefficient of kinetic friction*

Moments of Inertia of Areas

$$I_x = \int_A y^2 dA$$

$$I_y = \int_A x^2 dA$$

$$I_x = I_x^C + A d_y^2$$

$$I_y = I_y^C + A d_x^2$$

Parallel Axes Theorem

$$k = \sqrt{\frac{I}{A}}$$

Radius of Gyration