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

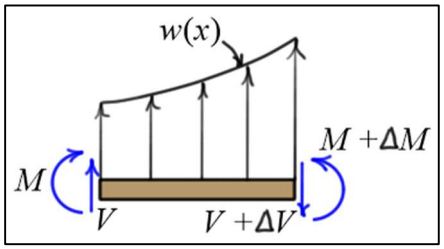
Shear Force and Bending Moment Diagrams

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

$$\Delta V = \int w(x)\,dx \quad \begin{cases} \text{Change in shear force} = \\ \text{Area under the load diagram} \end{cases}$$

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

$$\Delta M = \int V(x)\,dx \quad \begin{cases} \text{Change in bending moment} = \\ \text{Area under the shear diagram} \end{cases}$$



Dry Friction

$f_{\max} = \mu_s N$ $\quad \mu_s$ is the ***coefficient*** of ***static friction***

$f_{\text{dyn}} = \mu_k N$ $\quad \mu_k$ is the ***coefficient*** of ***kinetic friction***

Moments of Inertia of Areas

$$I_x = \int_A y^2 dA \qquad I_y = \int_A x^2 dA$$

$$I_x = I_x^C + A d_y^2 \qquad I_y = I_y^C + A d_x^2$$ Parallel Axes Theorem

$k = \sqrt{\frac{I}{A}}$ Radius of Gyration