Relations between Load, Shear and Bending Moment, assuming that a downward load is positive. See derivation in 8.6 of the textbook. There, an upward load positive.

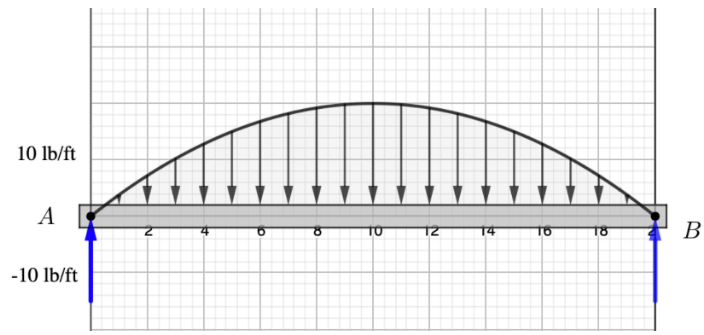
$$\frac{dV}{dx} = -\,w(x) \qquad \frac{dM}{dx} = V(x)$$

$$\Delta V = -\int w(x)\,dx \qquad \Delta M = \int V(x)\,dx$$

Example 1

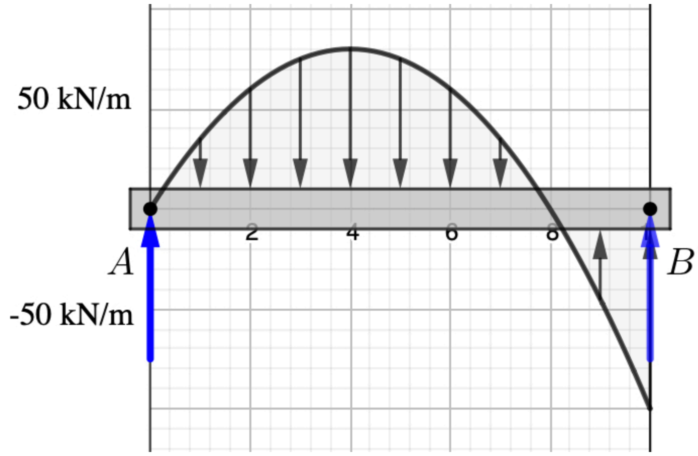
A 20 ft long beam is supporting a distributed load which varies according to the relation

$$w(x) = -\frac{x^2}{5} + 4x \quad \text{(lb/ft)}$$



A. Determine the reactions at *A* and *B*.
B. Determine the equations of shear and bending moment as functions of *x* and plot them below the load.
C. Determine the value of the maximum internal moment.

Example 2



A 10 m long beam is subjected to a parabolic distributed load which varies according to this relationship:

$$w(x) = (-5x^2 + 40x) \text{ kN/m} \qquad L = 10 \text{ m}$$

Draw the shear and bending moment diagrams and determine:

A. the reactions at A and B, and
B. the maximum (signed) values of shear and bending moment.