

# Integration: overview

- Fundamental idea of integration: adding up infinitely many infinitesimal contributions to a total
- Flavors so far:

- integration over a line segment (i.e., a region in  $\mathbb{R}^1$ ):

$$\int_a^b f(x) dx \text{ or } \int_{[a,b]} f dx$$

- integration over a planar region  $R$  (i.e., a region in  $\mathbb{R}^2$ ):

$$\iint_R f dA$$

- integration over a solid region  $D$  (i.e., a region in  $\mathbb{R}^3$ ):

$$\iiint_D f dV$$

- integration over a curve  $C$  in plane or space:

$$\int_C f ds$$