

0D integral

1D integral

2D integral

3D integral

 $f: \mathbb{R}^1 \rightarrow \mathbb{R}$ Eval f at point 18.01 integral

$$\begin{array}{c} \xleftarrow{\quad\bullet\quad} \\ f(x_0) \end{array} \xrightarrow{\frac{df}{dx}} \begin{array}{c} \xleftarrow{\quad\bullet\bullet\quad} \\ b \\ \int_a^b f(x) dx \end{array}$$

© 2024 Evan Chen

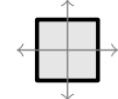
<https://web.evanchen.cc/> $\mathbf{F}: \mathbb{R}^2 \rightarrow \mathbb{R}^2$

$$\nabla f \text{ (grad)} \xrightarrow{\quad\quad} \begin{array}{c} \int_{t_0}^{t_1} \mathbf{F}(\mathbf{r}(t)) \cdot \mathbf{r}'(t) dt \\ \text{Work} \\ \curvearrowright \end{array}$$

Eval f at point Line integral

$$\begin{array}{c} \xleftarrow{\quad\bullet\quad} \\ f(x_0, y_0) \end{array} \xrightarrow{\quad\quad} \begin{array}{c} \curvearrowright \\ \int_{t_0}^{t_1} f(\mathbf{r}(t)) |\mathbf{r}'(t)| dt \end{array}$$

Double/area integral

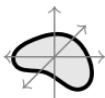
 $f: \mathbb{R}^2 \rightarrow \mathbb{R}$ 

$$\int_{a_1}^{b_1} \int_{a_2}^{b_2} f(x, y) dx dy$$

Eval f at point Line integral $f: \mathbb{R}^3 \rightarrow \mathbb{R}$

$$\begin{array}{c} \xleftarrow{\quad\bullet\quad} \\ f(x_0, y_0, z_0) \end{array} \xrightarrow{\quad\quad} \begin{array}{c} \curvearrowright \\ \int_{t_0}^{t_1} f(\mathbf{r}(t)) |\mathbf{r}'(t)| dt \end{array}$$

Surface integral

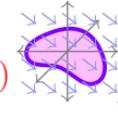


$$\int_{u_0}^{u_1} \int_{v_0}^{v_1} f(\mathbf{r}(u, v)) \left| \frac{\partial \mathbf{r}}{\partial u} \times \frac{\partial \mathbf{r}}{\partial v} \right| du dv$$

 ∇f (grad)

$$\xrightarrow{\quad\quad} \begin{array}{c} \xleftarrow{\quad\bullet\bullet\quad} \\ \int_{t_0}^{t_1} \mathbf{F}(\mathbf{r}(t)) \cdot \mathbf{r}'(t) dt \end{array}$$

Flux



Triple/volume integral

$$\int_{a_1}^{b_1} \int_{a_2}^{b_2} \int_{a_3}^{b_3} f(x, y, z) dx dy dz$$

 $\nabla \cdot \mathbf{F}$ (div) $\mathbf{F}: \mathbb{R}^3 \rightarrow \mathbb{R}^3$

$$\xrightarrow{\quad\quad} \begin{array}{c} \xleftarrow{\quad\bullet\bullet\quad} \\ \int_{u_0}^{u_1} \int_{v_0}^{v_1} \mathbf{F}(\mathbf{r}(u, v)) \cdot \left(\frac{\partial \mathbf{r}}{\partial u} \times \frac{\partial \mathbf{r}}{\partial v} \right) du dv \end{array}$$