15.2 Videos Guide

15.2a

- The double integral over general regions
  - $\iint_D f(x, y)\, dA$

$$= \int_a^b \int_{g_1(x)}^{g_2(x)} f(x, y)\, dy dx \qquad \text{if } D = \{(x, y)|a \le x \le b, g_1(x) \le y \le g_2(x)\}$$

OR $$= \int_c^d \int_{h_1(y)}^{h_2(y)} f(x, y)\, dx dy \qquad \text{if } D = \{(x, y)|h_1(y) \le x \le h_2(y), c \le y \le d\}$$

Exercises:

15.2b

- Evaluate the iterated integral.
  - $\int_0^2 \int_0^{y^2} x^2 y\, dx\, dy$

15.2c

- $\int_0^{\pi/2} \int_0^x x \sin y\, dy\, dx$
- Evaluate the double integral.

$\iint_D (x^2 + 2y)\, dA,\ D$ is bounded by $y = x,\ y = x^3,\ x \ge 0$

15.2d

- Find the volume of the solid enclosed by the paraboloid $z = x^2 + y^2 + 1$ and the planes $x = 0,\ y = 0,\ z = 0$, and $x + y = 2$.
- Sketch the region of integration and change the order of integration.

$$\int_0^2 \int_{x^2}^4 f(x, y)\, dy\, dx$$

15.2e

- Evaluate the integral by reversing the order of integration.

$$\int_0^1 \int_{x^2}^1 \sqrt{y} \sin y\, dy\, dx$$