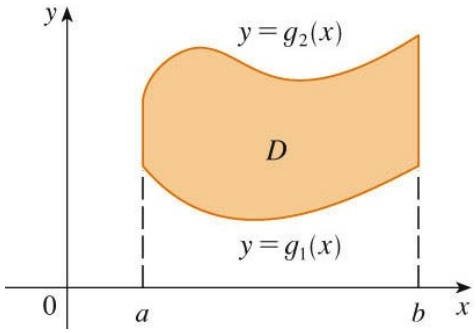
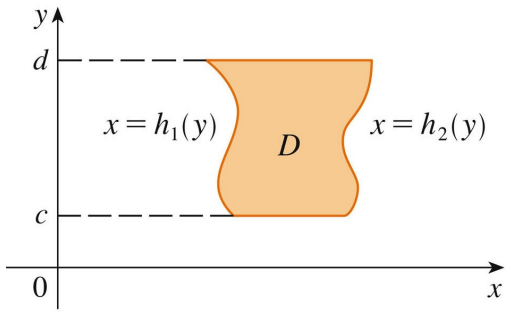
Lesson 44a. Double Integrals Over General Regions, cont.

- Type I region:



$$\iint_D f(x,y)\,dA = \int_a^b \int_{g_1(x)}^{g_2(x)} f(x,y)\,dy\,dx$$

- Type II region:



$$\iint_D f(x,y)\,dA = \int_c^d \int_{h_1(y)}^{h_2(y)} f(x,y)\,dx\,dy$$

Example 1. Consider the double integral $\iint_D f(x,y)\,dA$ where D is enclosed by $x = 0$, $x = \sqrt{1-y^2}$. Set up this double integral as an iterated integral using both orders of integration.

Example 2. Consider the double integral $\int_0^4 \int_{\sqrt{x}}^2 f(x,y)\,dy\,dx$. Sketch the region of integration and change the order of integration.

Example 3. Let D be some region in the xy-plane. What does $\iint_D 1\,dA$ represent? Explain.