MATH 275

October 10, 2007

Names ____

1. Let D be the region enclosed by the curves $y = \sqrt{x}$ and $y = x^2$.

   (a) Graph the region D.

   (b) Write the double integral $\iint_D xy \, dA$ as iterated integrals over x and y: (fill in the limits of integration).

$$\int \quad \int \qquad xy \; dydx.$$

   (c) Calculate the volume in part 1.(d).

2. Let $D = \{(x,y) | \sqrt{y} \leq x \leq 1, 0 \leq y \leq 1\}$.

(a) Graph the region D.

(b) Consider the double integral $\int_0^1 \int_{\sqrt{y}}^1 f(x,y)\, dxdy$. Use the plot in part 2.(a) to help you reverse the limits of integration: (fill in the limits of integration)

$$\int_0^1 \int_{\sqrt{y}}^1 f(x,y)\, dxdy = \int \int \quad f(x,y)\, dydx.$$

(c) Verify your limits of integration by making a new graph of D based on your choice, and noting that this region is the same as in 2.(a).

3. Let D be the region enclosed by circles of radius 1 and 2 in the first quadrant.

(a) Graph the region D.

(b) Let D_1 be the sub-region of D where $0 \leq x \leq 1$. Let D_2 be the sub-region of D where $1 \leq x \leq 2$. Illustrate D_1 and D_2 on your graph of D in part 3.(a).

(c) Write the double integral of a general function $g(x, y)$ over the region D as iterated integrals over x and y in the following manner: (fill in the limits of integration)

$$\iint_D g(x,y)dydx = \iint_{D_1} g(x,y)dydx + \iint_{D_2} g(x,y)dydx$$

$$= \int \int \quad g(x,y)dydx + \int \int \quad g(x,y)dydx$$

(d) Verify your limits of integration by making a new graph of D based on your choices, and noting that this region is the same as in 3.(a).