DUE DATE: Nov. 10, 2004

1. For each of the following regions R, first sketch the region, and then set up the integral $\iint_R f(x,y)\,dA$ as an iterated double integral. For the first region, set it up as a type I integral only. For the remaining regions, set them up as both type I and type II integrals.

(a) The region $R = \{(x,y) \mid 0 \le x \le \pi,\ |y| \le \sin(x)\}$.

(b) The region R to the left of the y-axis, and inside the circle $x^2 + y^2 = 1$.

(c) The region R to the right of the line $x = -2$, below the line $y = 3$, and above the line $y = \frac{1}{2}x$.

(d) The region R below $y = \sqrt{x}$ and above $y = x^2$.

2. Find $\iint_R f(x,y)\,dA$ in each of these cases:

(a) $f(x,y) = e^{-x-3y}$, $R = [0, \ln 2] \times [0, \ln 3]$

(b) $f(x,y) = xye^{x^2}$, $R = [-1, 1] \times [0, 1]$.

(c) $f(x,y) = \ln(xy)$, R is the triangular region bounded by the lines $y = 1$, $y = x$, and $x = 0$.

3. For each of the following integrals, change the order of integration and then compute the integral.

Reminder: There is no magic formula to know how to change the order of the integration. The only thing to do is to use the given double integral to sketch the region of integration, and then use the sketch to reverse the order.

(a) $\displaystyle\int_0^1 \left(\int_0^{\arcsin(x)} y^2\,dy \right) dx$ (b) $\displaystyle\int_0^1 \left(\int_y^1 e^{x^2}\,dx \right) dy$ (c) $\displaystyle\int_0^1 \left(\int_{\arcsin(y)}^{\pi/2} y\cos(x)\,dx \right) dy$

(d) $\displaystyle\int_{1/2}^1 \left(\int_1^{2y} \frac{\ln x}{x}\,dx \right) dy + \int_1^2 \left(\int_y^2 \frac{\ln x}{x}\,dx \right) dy$