

Please provide complete and well-written solutions to the following exercises.

No due date, but the quiz in Week 15 in the discussion section (on November 29) will be based upon this homework.

## Q12: Quiz 12 Problems

**Exercise 1.** Estimate the double integral

$$\iint_{[0,2] \times [0,2]} f dA.$$

To do this, use a Riemann sum with four terms in the sum which represent four squares of area 1 each. Use also the lower left point of each square to compute the Riemann sum. Use the following facts:  $f(0,0) = 1$ ,  $f(0,1) = 2$ ,  $f(1,0) = 5$ , and  $f(1,1) = -1$ .

**Exercise 2.** Calculate the following integral.

$$\int_{x=0}^{x=1} \int_{y=0}^{y=1} 15xy\sqrt{x^2 + y^2} dydx.$$

**Exercise 3.** Sketch the region of integration of the following integral, and then evaluate the integral.

$$\int_{x=0}^{x=2} \int_{y=0}^{y=x} xy^2 dydx.$$

**Exercise 4.** Sketch the region of integration of the following integral, and then reverse the order of integration to get an equivalent integral.

$$\int_{y=0}^{y=1} \int_{x=y}^{x=\sqrt{y}} dx dy.$$

**Exercise 5.** Integrate the function  $f(x,y) = (x+y+1)^{-2}$  over the triangle with vertices  $(0,0)$ ,  $(4,0)$  and  $(0,6)$ .

**Exercise 6.** Integrate the function  $f(x,y) = x^2y$  over the region  $1 \leq x \leq 2$  and  $x \leq y \leq 2x+2$ .

**Exercise 7.** Sketch the region of integration, reverse the order of integration, and then evaluate the integral.

$$\int_{x=0}^{x=3} \int_{y=x/3}^{y=1} e^{y^2} dy dx.$$