

**Exam 2 Review**

(1.) Evaluate  $\iint_R f(x, y) dA$  where

(a.)  $f(x, y) = xy$  and  $R$  is the region bounded by the parabola  $y = 2x^2$  and the line  $y = x + 1$ .

(b.)  $f(x, y) = x^2$  and  $R$  is region within the cardioid  $r = 1 + \sin \theta$ .

(c.)  $f(x, y) = x^2 + y^2$  and  $R$  is the triangle with vertices  $(0, 0)$ ,  $(2, 0)$  and  $(0, 2)$ .

(2.) Setup an integral to determine the area of the surface  $z = x^2y + 2x - 4y$  which lies over the region in the  $xy$ -plane bounded by  $y = 4 - x$  and  $y = \frac{x^2}{2}$ . DO NOT SOLVE.

(3.) Evaluate the integral:

(a.)  $\int_0^1 \int_y^1 e^{x^2} dx dy$

(b.)  $\int_0^1 \int_0^{\sqrt{1-x^2}} x^2 dy dx$

(4.) Evaluate the integral:

(a.)  $\iiint_D z dV$  where  $D$  is bounded above by the sphere  $x^2 + y^2 + z^2 = 4$  and below by the plane  $z = 0$ .

(b.)  $\iiint_D xy dV$  where  $D$  is the solid bounded by the planes  $x = 0, y = 0, z = 0$  and  $x + y + z = 1$ .

(c.)  $\iiint_D z dV$  where  $D$  is the solid bounded above by the sphere  $x^2 + y^2 + z^2 = 25$ , bounded on the sides by the cylinder  $x^2 + y^2 = 9$  and bounded below by the  $xy$ -plane.

(5.) Find the volume of the solid  $D$  where

(a.)  $D$  is the solid in the first octant bounded by the surface  $z = xy$  and the planes  $z = 0, x = y, x = 2$  and  $y = 0$ .

(b.)  $D$  is the solid in the first octant bounded above by the sphere  $x^2 + y^2 + z^2 = 2$  and bounded below by the paraboloid  $z = x^2 + y^2$ .

(c.)  $D$  is the solid bounded above by the sphere  $x^2 + y^2 + z^2 = 9$  and below by the cone  $z = -\sqrt{x^2 + y^2}$ .