

# MA 213 Worksheet #16

Section 15.6

03/19/19

1 15.6.3 Evaluate the following iterated integral:  $\int_0^2 \int_0^{z^2} \int_0^{y-z} (2x - y) dx dy dz$

2 15.6.9, 15.6.13, 15.6.15 Evaluate the following triple integrals:

(a)  $\iiint_E y dV$ , where  $E = \{(x, y, z) | 0 \leq x \leq 3, 0 \leq y \leq x, x - y \leq z \leq x + y\}$

(b)  $\iiint_E 6xy dV$ , where  $E$  is the (three dimensional) region that lies under the plane  $z = 1 + x + y$  and above the (two dimensional) region in the  $xy$ -plane that is bounded by the curves  $y = \sqrt{x}$ ,  $y = 0$  and  $x = 1$ .

(c)  $\iiint_T y^2 dV$ , where  $T$  is the solid tetrahedron with vertices  $(0, 0, 0)$ ,  $(2, 0, 0)$ ,  $(0, 2, 0)$  and  $(0, 0, 2)$ .

3 15.6.21 Use a triple integral to find the volume of the solid enclosed by the cylinder  $y = x^2$  and the planes  $z = 0$  and  $y + z = 1$ .

4 15.6.27, 15.6.35

(a) Sketch the solid whose volume is given by the integral  $\int_0^1 \int_0^{1-x} \int_0^{2-2z} dy dz dx$

(b) Write the five other iterated integrals that are equal to the following iterated integral:  
 $\int_0^1 \int_y^1 \int_0^y f(x, y, z) dz dx dy$

5 15.6.37 Evaluate the following triple integral using only geometric interpretation and symmetry,

$$\iiint_C (4 + 5x^2yz^2) dV, \text{ where } C \text{ is the cylindrical region } x^2 + y^2 \leq 4, -2 \leq z \leq 2$$

6 15.6.42 Find the mass and center of mass of a solid tetrahedron bounded by the planes  $x = 0$ ,  $y = 0$ ,  $z = 0$  and  $x + y + z = 1$  with density function  $\rho(x, y, z) = y$ .

7 15.6.43 Find the moments of inertia for a cube with side length  $L$ , one vertex at the origin and three edges along the coordinate axes and constant density  $k$ .