AMAT 219 PRACTICE SHEET #9

1. Determine $\iiint_R (xy+z)\,dV$, where R is the rectangular box described by $0 \le x \le 1$, $-1 \le y \le 1$, $0 \le z \le 3$.

2. Compute $\iiint_D dV$, where D is the region described by $0 \le x \le 1-3y-z$, $0 \le z \le 1-3y$, $0 \le y \le \frac{1}{3}$.

3. Compute $\iiint_R z\,dV$, where R is the region enclosed by the planes $x = 0, y = 0, z = 0$, and $x+y+z = 2$.

4. Use triple integrals to find the volume of the region in the first octant below the plane $2x+y+3z = 6$.

5. Evaluate $\iiint_R 3y^2\,dV$, where R is the region in the first octant below the plane $x+y+2z = 2$ by integrating with respect to " y" first.

6. Evaluate the moment about the $xy-$plane of the region such that $0 \le y \le 1-x^2$, $0 \le z \le x$.

7. Use triple integrals to find the volume of the region described by $x \ge 0$, $y \ge 0$, $z \ge 0$, $x+y \le 1$, and $z \le y$.

8. Use triple integrals to find the volume of the solid that lies inside the sphere $x^2+y^2+z^2 = 25$ and outside the cylinder $x^2+y^2 = 9$.

9. Use triple integrals to find the volume of the solid bounded by the paraboloid $z = 2(x^2+y^2)$, and the plane $z = 2$

10. Use cylindrical coordinates to compute $\iiint_R z\,dV$, where R is the region bounded by the cone $z = \sqrt{x^2+y^2}$, and the plane $z = 2$.

11. Use spherical coordinates to compute $\iiint_R z^2\sqrt{x^2+y^2+z^2}\,dV$, where is the region enclosed by the sphere $x^2+y^2+z^2 = 3$.

12. Determine $\iiint_R x^2z\,dV$, where R is the hemi-spherical region $x^2+y^2+z^2 \le 3$, $z \ge 0$.

13. Determine $\iiint_D \frac{1}{\sqrt{1+(x^2+y^2+z^2)^{\frac{3}{2}}}}\,dV$, where D is the region described by $0 \le z \le \sqrt{4-x^2-y^2}$.

14. Determine $\iiint_R (y^3 + 3yz^2)\, dV$ where R is the region occupied by a solid with density function $\delta(x, y, z) = y^2 + 3z^2$, mass equal to 9 , and centre of mass at the point $(3, 2, 4)$.

15. Find the volume of the solid which occupies the region R whose centroid is at the point $(3, 2, 15)$, and its moment about the plane $x = 0$ is equal to 15.

ANSWERS

1. 9 2. $\frac{1}{18}$ 3. $\frac{2}{3}$ 4. $V = 6$ 5. $\frac{4}{5}$

6. $M_{z=0} = \frac{1}{15}$ 7. $\frac{1}{6}$ 8. $V = \frac{256}{3}\pi$ 9. $V = \pi$ 10. 4π

11. 6π 12. $\frac{9\pi}{8}$ 13. $\frac{8\pi}{3}$ 14. $M_{y=0} = 18$ 15. $V = 5$