

Math 242, Merit Worksheet 24, Fall 2005

- Find upper and lower bounds for
 - $\int \int_D \sqrt{x^3 + y^3} dA$, where $D = [0, 1] \times [0, 1]$.
 - $\int \int_D e^{x^2+y^2} dA$, where D is the disk with centre the origin and radius $1/2$.
- What is the value of $\int \int_D \sqrt{1 - x^2 - y^2} dA$, where D is the disk with $x^2 + y^2 \leq 1$? $\int \int_D (1 - \sqrt{x^2 + y^2}) dA$? $\int \int_D (5 - x^2 \sin x + y^3 \cos y) dA$?
- Describe the solid bounded by the graphs $y = x^2$, $z = y$, $y = 4$ and $z = 0$ and then find its volume.
- Find the volume removed when a vertical square hole of edge length R is cut directly through the centre of a long horizontal solid cylinder of radius R .
- Find the volume V of the solid T bounded by the parabolic cylinders $z = x^2$, $z = 2x^2$, $y = x^2$ and $y = 8 - x^2$.
- Find the volume of the solid bounded by the two paraboloids $z = x^2 + 2y^2$ and $z = 12 - 2x^2 - y^2$. (There is a picture of this solid on page 962 of your textbook.)
- Express the following integral in polar coordinates:

$$\int_{-2}^0 \int_0^{\sqrt{4-x^2}} x^2 + y^2 dy dx.$$

- Express the following integral in cartesian coordinates: $\int_0^3 \int_{\pi}^{\pi/2} r d\theta dr$.
- Find the volume of the “ice-cream cone” bounded by the sphere $x^2 + y^2 + z^2 = 1$ and the cone $z = \sqrt{x^2 + y^2}$.

Warm-up for Thursday

Find the area bounded by one loop of $r = 2 \cos 2\theta$.