

Worksheet 15

April 2, 2008

1. Sketch the regions whose areas are given by

$$\int_{-1}^0 \int_0^{\sqrt{1-x^2}} dy dx$$

$$\int_{-1}^1 \int_0^{\sqrt{1-x^2}} dy dx$$

$$\int_0^1 \int_0^{\sqrt{1-x^2}} dy dx$$

$$\int_{-1}^0 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} dy dx$$

$$\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} dy dx$$

$$\int_0^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} dy dx$$

$$\int_{-1}^0 \int_{-\sqrt{1-x^2}}^0 dy dx$$

$$\int_{-1}^1 \int_{-\sqrt{1-x^2}}^0 dy dx$$

$$\int_0^1 \int_{-\sqrt{1-x^2}}^0 dy dx$$

2. Last Monday you integrated xy over (a) the portion of the unit disc lying in the first quadrant, (b) the portion of the unit disc lying in the upper half-plane, and (c) the whole unit disc. Do the same in polar coordinates. Explain the symmetry by graphing $\frac{1}{2} \sin 2\theta$.
3. Integrate $\frac{1}{1+x^2+y^2}$ over the whole plane
- (a) in rectangular coordinates, and
 - (b) in polar coordinates.
4. Find the centroid of a cone.
5. Find the volume of the intersection of two balls.