

Worksheet 21

April 30, 2008

- Sketch the part of the surface $z = x^2 + y^2$ inside the cylinder $x^2 + y^2 = 1$. Find its area.
 - Sketch the part of the surface $z = x^2 - y^2$ inside the cylinder $x^2 + y^2 = 1$. Find its area.
- Find the center of mass of half of a solid ball.
 - Find the center of mass of half of a sphere (just the surface).
- Find the moment of inertia of a sphere (just the surface, not the interior) of radius R about the z -axis. Compare this to the moment of inertia of a solid ball about the z -axis, which you computed on the exam.
- You will find yourself integrating over a sphere pretty often. For a sphere of radius R , what is $d\sigma$ in rectangular coordinates? In polar coordinates?
- Sketch the ellipsoid

$$\frac{x^2}{a^2} + \frac{y^2}{a^2} + \frac{z^2}{b^2} = 1$$

twice, once if $a < b$ (called a “prolate spheroid”) and then if $a > b$ (called an “oblate spheroid”). Find its surface area.