Lecture 12: Iterated integrals

Math 195 Section 91

Friday July 17, 2009

16.3, 16.4 16.5, 16.6

1 polar coordinates (16.4)

reminder about polar coordinates
- shape of "polar rectangle"
- area of "polar rectangle"
- example: find the volume bounded by the plane $z = 0$ and the paraboloid $z = 1 - x^2 + y^2$
- example: find the volume of a sphere.

2 applications? (16.5)

imagine an "applied literature" course, or an "applied art" course.
- average value
- center of mass

3 triple integrals (16.6)

definition
- "rectangles" in R^3.
- fubini still works
- example: integrate a polynomial over a box
- example: integrate the "1" function over the tetrahedron

4 cylindrical coordinates (16.7)

a combination of polar and cartesian coordinates
- $x = r\cos\theta$, $y = r\sin\theta$ and $z = z$.
- draw a picture

volume of a cylinder

find the volume of the solid that lies within both the cylidner $x^2 + y^2 = 1$ and the sphere $x^2 + y^2 + z^2 = 4$.