

Math 233 - November 6, 2009

- Polar integrals
- Green's Theorem!

1. Use rectangular coordinates to compute

$$\int_0^{\pi/4} \int_0^{\sec \theta} r^3 \sin^2 \theta \, dr \, d\theta =$$

2. Use polar coordinates to compute the volume between the graph of $z = 1 - x^2 - y^2$ and the xy -plane.

$$V =$$

3. Use polar coordinates to compute (this is probably not an integral that you would actually want to change to polar, but you should be able to anyway)

$$\int_1^2 \int_{-y}^y y \, dx \, dy =$$

Lecture Problems

4. Use Green's theorem to compute the line integrals

- (a) Let C be the closed curve oriented counter clockwise formed by $y = x/2$ and $y = \sqrt{2}$ between $(0, 0)$ and $(4, 2)$.

$$\oint_C 2xy \, dx + y^2 \, dy =$$

- (b) Let C be the closed curve oriented counter clockwise formed by $y = 0$ and $x = 2$ and $y = x^3/4$.

$$\oint_C (2x + y^2) \, dx + (x^2 + 2y) \, dy =$$

- (c) Let C be the ellipse, $9x^2 + 16y^2 = 144$ oriented counter clockwise.

$$\oint_C (x^2 + 4xy) \, dx + (2x^2 + 3y) \, dy =$$