

**Math 280 Section C1 Quiz 6**  
March 9, 2001

**Problem 1.**

Compute the following integral:

$$\int_{x^2+y^2 \leq 4} \sqrt{x^2+y^2} \, dx \, dy.$$

**Solution**

We will make the polar coordinates substitution  $x = r \cos \theta$ ,  $y = r \sin \theta$ . Then

$$\left| \frac{\partial(x, y)}{\partial(u, v)} \right| = r$$

and

$$\int_{x^2+y^2 \leq 4} \sqrt{x^2+y^2} \, dx \, dy = \int_0^2 \int_0^{2\pi} r \cdot r \, d\theta \, dr = 2\pi \int_0^2 r^2 \, dr = 2\pi \left[ \frac{r^3}{3} \right]_0^2 = \frac{16\pi}{3}.$$