

Math 210 (Lesieutre)

13.3: Double integrals in polar coordinates

March 3, 2017

Problem 1. Sketch the regions corresponding to the following double integrals.

a)
$$\int_1^2 \int_{\pi/2}^{\pi} f(r, \theta) r \, dr \, d\theta$$

b)
$$\int_0^{1+\cos\theta} \int_0^{2\pi} f(r, \theta) r \, dr \, d\theta$$

Problem 2. Find the area inside the cardioid $r(\theta) = 1 + \cos\theta$.

Problem 3. Find the volume of the region under the graph $f(x, y) = 1 - x^2 - y^2$ above the unit circle R .

Problem 4. a) Rewrite the following integral in Cartesian coordinates: $\iint_R 2xy \, dA$, where R is part of a circle of radius 4 that lies in the first quadrant.

b) Evaluate the integral.