

Math 210 (Lesieutre)

13.3: Double integrals in other coordinate systems

March 3, 2017

**Problem 1.** Evaluate the integral

$$\int_0^1 \int_{x^2}^1 xy \, dy \, dx$$

**Problem 2.** Sketch the region of integration for each of the following double integrals.

a)  $\int_0^1 \int_0^x f(x, y) \, dy \, dx$

b)  $\int_0^1 \int_{y^2}^1 f(x, y) \, dx \, dy$

c)  $\int_0^2 \int_{x^3}^{4x} f(x, y) \, dy \, dx$

**Problem 3.** For each of the double integrals in the previous problem, write bounds in new coordinates to reverse the order of integration.

a)  $\int_0^1 \int_0^x f(x, y) dy dx$

b)  $\int_0^1 \int_{y^2}^1 dx dy$

c)  $\int_0^2 \int_{x^3}^{4x} dy dx$

**Problem 4.** Find the area of the region in (b) by integrating the function  $f(x, y) = 1$ . Check that you get the same answer for either order of integration.