

Math 210 (Lesieutre)
Quiz 7
March 10, 2017

Name: _____

Problem 1. Use a double integral in polar coordinates to find the area of the unit circle $r = 1$. (No credit for finding the area without a double integral.)

The area is given by

$$\begin{aligned} A &= \int_{r=0}^1 \int_0^{2\pi} 1 \, dA = \int_0^{2\pi} \int_{r=0}^1 1 \, r \, dr \, d\theta \\ &= \int_0^{2\pi} \left(\frac{r^2}{2} \right) \Big|_0^1 d\theta = \int_0^{2\pi} \frac{1}{2} d\theta = \pi. \end{aligned}$$

This matches up with the formula you have probably heard before, $A = \pi r^2 = \pi 1^2 = \pi$.