QUIZ 21: LESSON 28
NOVEMBER 9, 2018

Write legibly, clearly indicate the question you are answering, and put a box or circle around your final answer. If you do not clearly indicate the question numbers, I will take off points. Write as much work as you need to demonstrate to me that you understand the concepts involved. If you have any questions, raise your hand and I will come over to you.

Let R be the region in the first quandrant bounded by

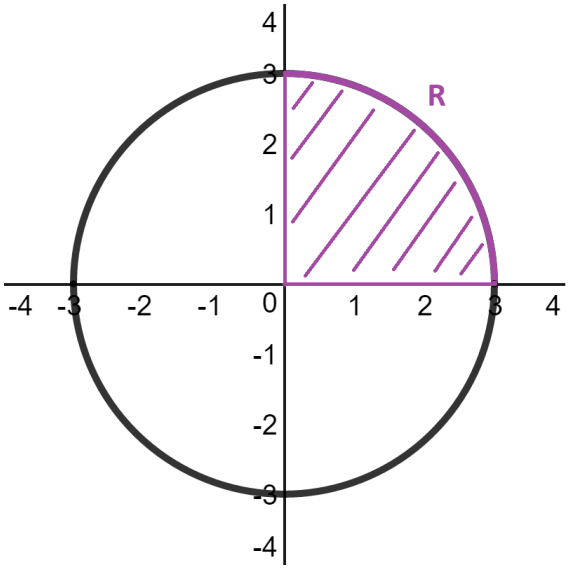
$$x = 0, \quad y = 0, \quad y = \sqrt{9 - x^2}.$$

1. [2 pts] Sketch a picture of the region R.

Solution: We see that $y = \sqrt{9 - x^2}$ can be rewritten as:

$$\begin{aligned} & y = \sqrt{9 - x^2} \\ \Rightarrow \quad & y^2 = (\sqrt{9 - x^2})^2 \\ \Rightarrow \quad & y^2 = 9 - x^2 \\ \Rightarrow \quad & x^2 + y^2 = 9 \\ \Rightarrow \quad & x^2 + y^2 = 3^2 \end{aligned}$$

which is an equation of a circle of radius 3 centered at the origin. Since we are in the first quadrant, our region ought to be



This region may be described by either

$$\begin{cases} 0 \le y \le \sqrt{9-x^2} \\ 0 \le x \le 3 \end{cases} \quad \text{OR} \quad \begin{cases} 0 \le x \le \sqrt{9-y^2} \\ 0 \le y \le 3 \end{cases}$$

2. [8 pts] The volume under $f(x,y) = e^{x^2}$ over the region R may be denoted by either

$$\int_0^3 \int_0^{\sqrt{9-x^2}} e^{x^2}\, dy\, dx$$

or

$$\int_0^3 \int_0^{\sqrt{9-y^2}} e^{x^2}\, dx\, dy.$$