Math 261-001
Quiz 5, October 3

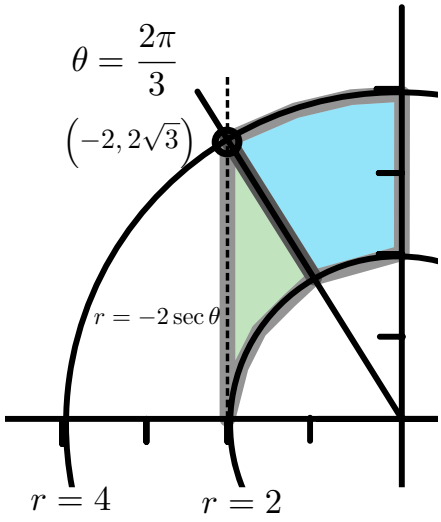
Name	CSU ID #

Be sure to read each question carefully. You must choose and answer **exactly two** of the four problems. If you attempt more than two, only the first two will be graded. Write your final answers in the boxes provided. Each problem is worth the same amount of points. **Each problem is accompanied by a figure to help you visualize the region of integration.**

1. Consider the integral

$$\int_{-2}^{0}\int_{\sqrt{4-x^2}}^{\sqrt{16-x^2}} f(x,y)\,dy\,dx.$$

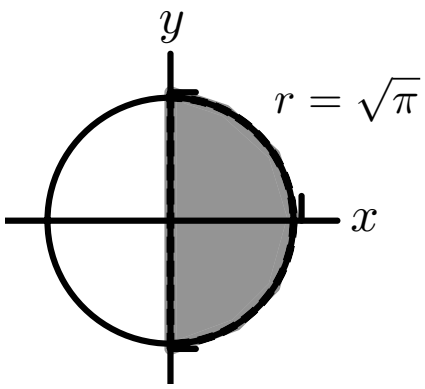
By changing to polar coordinates, rewrite this integral as the sum of two integrals in polar form.



2. Evaluate the double integral

$$\int_{-\sqrt{\pi}}^{\sqrt{\pi}}\int_{0}^{\sqrt{\pi-y^2}} \sin\left(x^2+y^2\right)\,dx\,dy$$

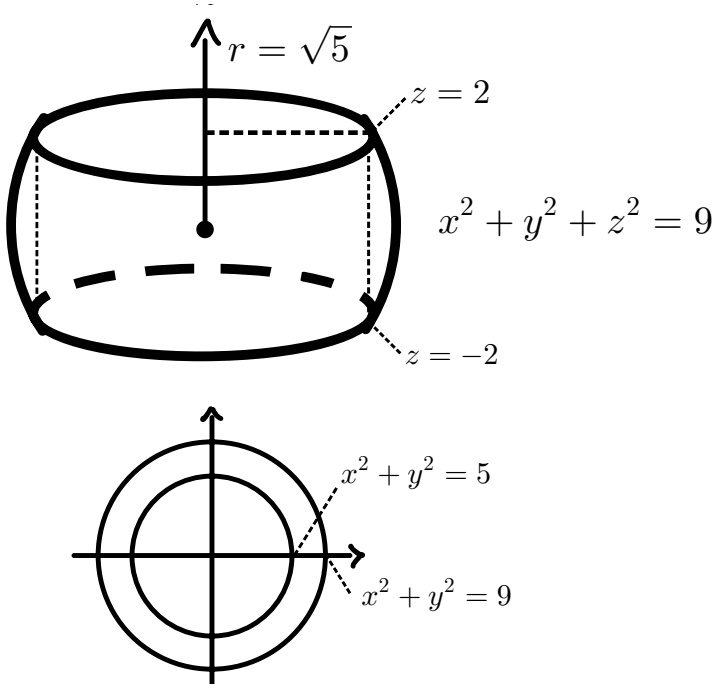
by changing to polar coordinates, and **compute its exact value**.



3. You're walking in your favorite supermarket and spot a **cheese wedge**! You decide to calculate its volume using cylindrical coordinates. Model the wedge as the region bounded by

$$x^2 + y^2 + z^2 = 9, \quad z = 2, \quad z = -2.$$

Using the cylindrical substitution $x = r\cos\theta,\ y = r\sin\theta,\ z = z$, set up an integral expression for the volume.



4. Now you're holding an **ice cream cone**, and you want to find its volume. The solid is enclosed by

$$z = \sqrt{x^2 + y^2}, \quad \text{and} \quad x^2 + y^2 + (z-1)^2 = 1.$$

Using cylindrical coordinates, set up an integral that computes the volume of this solid.