

QUIZ 8

NAME:

Problem 1: Surface Area:

Using any method you like, compute the surface area of the cone bounded by $z \leq 1 - \sqrt{x^2 + y^2}$ and $z \geq 0$.

Problem 2: Setting Up Integrals:

Let $f(r, \theta) = r^2$. Let D be the region given by $0 \leq r \leq \sin(2\theta)$.

- Write an integral for the volume between f and the $z = 0$ plane in polar coordinates. Do not evaluate the integral.
- Write an integral that computes the volume between f and the $z = 0$ plane in xy coordinates. Do not evaluate the integral.

Problem 3: Japanese Napkin Ring:

A napkin ring of height one is taken by taking a sphere of radius R , and removing a cylinder from it of radius $\sqrt{R^2 - (1/2)^2}$. Compute the volume of the napkin ring.

Interesting Puzzle, Will not be graded. Alice and Bob are in a long distance relationship, and are about to get married. This means that Bob needs to send Alice a ring. Alice has an envious neighbor Eve who searches all of her mail and has been trying to put an end to Alice's and Bob's happy relationship for years. Every package that travels between Bob and Alice is searched by Eve, unless it is shipped inside a padlocked box. Bob has a lot of padlocks for this purpose; however, only he has the keys to his padlocks. Similarly, Alice has many padlocks so that she can ship things securely to Bob; however, only she has the keys to her own padlocks. How can Bob get a wedding ring to Alice?