

**Problem 1**

Parametrize the paraboloid  $z = x^2 + y^2$  for  $z \leq 4$ .

**Problem 2**

Parametrize the portion of the plane  $x - y + 2z = 2$  inside the cylinder  $x^2 + y^2 = 3$ , then do the same for the cylinder  $y^2 + z^2 = 2$ .

**Problem 3**

Parametrize the portion of the cylinder  $y^2 + (z - 5)^2 = 25$  between the planes  $x = 0$  and  $x = 10$

## Problem 4

Set up the integral giving the surface area of the surfaces in problems 1-3 as parametrized surfaces AND as implicit surfaces. Evaluate them both to make sure you've done this correctly but you don't need to include your computation.

## Problem 5

Take the sphere of radius  $\sqrt{2}$  centered at the origin and the cone  $z = \sqrt{x^2 + y^2}$ . The intersection of these surfaces gives an upper part (the ice cream cone) and a lower part (don't know the name, I'm sure there is one...). Find the surface area of both using parametrizations or implicit surfaces.