1. Prepquiz 3 A

Problem 1: Find the volume of the solid that is bounded below by the xy plane, on the sides by the planes $y = 0, x = 0$ and $x + y = 1$ and on top by the surface $z = x^2 + y^2$.

Problem 2: The lemniscate is the curve given by the equation
$$(x^2 + y^2)^2 = 4xy \ .$$
a) Sketch this curve.

b) Find the area of the region enclosed by this curve.

Problem 3: Find the extremal values of $xy + yz + zx$ given the constraint $x + y + z = 1$. Are these values maxima or minima?