Name: Score: /8

Math 1321 Week 9 Lab Due Thursday 11/6

1. Let curve C on the plane be gluing the parabola $y = x^2 - 3$ and the line $y = 2x$ for $-1 \leq x \leq 3$. Also let $f(x, y) = -\frac{3}{2}x^2 + \frac{2}{3}xy$.

   (a) **(2 point)** Use the parametrization of curve C to find the extreme value of $f(x, y)$ on C.

(b) **(1 point)** Use Lagrange Multipliers to find the extreme value of $f(x, y)$ on C.

2. **(2 point)** The density of a metallic spherical surface $x^2 + y^2 + z^2 = 4$ is given by $\rho(x, y, z) = 2 + xz + y^2$. Find the places where the density is the highest and the lowest. [Hint: there are two minima and two maxima].

3. **(3 point)** Find the extreme values of $f(x, y) = x^2 + xy + 2y^2$ on the disk $x^2 + y^2 \leq 1$. [Hint: First find critical points strictly inside the disk, and then find extreme values on the boundary of the disk using Lagrange Multipliers. Finally compare them to get the global extreme values on the disk.]