Ma 1c Prac Assignment 4

Due 2pm Monday, April 25, 2016.

In the following two exercises, find the extrema of $f$ subject to the stated constraints.

1 Problem 3.4.4

$f(x, y) = x - y$, subject to $x^2 - y^2 = 2$.

2 Problem 3.4.6

$f(x, y, z) = x + y + z$, subject to $x^2 - y^2 = 1$ and $2x + z = 1$.

3 Problem 3.4.12

Use the method of Lagrange multipliers to find the absolute maximum and minimum values of $f(x, y) = x^2 + y^2 - x - y + 1$ on the unit disc.

4 Problem 3.4.23

Find the absolute maximum and minimum for the function $f(x, y, z) = x + y - z$ on the ball $B = \{(x, y, z) \mid x^2 + y^2 + z^2 \leq 1\}$.

5 Problem 4.2.3

Find the arc length of $(\sin 3t, \cos 3t, 2t^{3/2})$ on the interval $0 \leq t \leq 1$. 
6   Problem 4.2.10

Compute the length of the curve \( c(t) = (\log(\sqrt{t}), \sqrt{3t}, \frac{3}{2}t^2) \) for \( 1 \leq t \leq 2 \).

In the following two exercises, show that the given curve \( c(t) \) is a flow line of the given velocity vector field \( \mathbf{F}(x, y, z) \).

7   Problem 4.3.15

\( c(t) = (e^{2t}, \log |t|, 1/t), \ t \neq 0; \ \mathbf{F}(x, y, z) = (2x, z, -z^2) \).

8   Problem 4.3.17

\( c(t) = (\sin t, \cos t, e^t); \ \mathbf{F}(x, y, z) = (y, -x, z) \).