Ma 1c Prac Assignment 4

Due 2pm Monday, April 27, 2015.

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 3.4.24

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

5 Problem 4.2.6

Find the arc length of $(t, t\sin t, t\cos t)$ on the interval $0 \leq t \leq \pi$.

6 Problem 4.2.10

Compute the length of the curve $c(t) = (\log(\sqrt{t}), \sqrt{3t}, \frac{1}{2}t^2)$ 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 $F(x, y, z)$. 
7 Problem 4.3.15
\( c(t) = (e^{2t}, \log |t|, 1/t), \ t \neq 0; \ F(x, y, z) = (2x, z, -z^2). \)

8 Problem 4.3.18
\( c(t) = (\frac{1}{t^3}, e^t, \frac{1}{t}); \ F(x, y, z) = (-3z^4, y, -z^2). \)