DEPARTMENT OF MATHEMATICS
UNIVERSITY OF KANSAS
MATH 143 - SPRING 2006 - SAMPLE EXAM 2

Your Name: _____

On this exam, you may use a calculator, but no books or notes.

It is not sufficient to just write down the answers. You must explain how you arrived at your answers and how you know they are correct.

1	(40)	_____
2	(40)	_____
3	(40)	_____
4	(40)	_____
5	(40)	_____
Total	(200)	_____

(1) a) Find the relative extrema of

$$f(x, y) = x^2 - 2x + y^2 - 1.$$

b) Find the relative extrema of the same f on the curve $x^2 + y^2 = 1$.

(2) a) Find the arc length of

$$c(t) = (2t, t^2), \quad 0 \leq t \leq 1.$$

b) Find the arc length of

$$c(t) = (2\sin^2 t, \sin^4 t), \quad 0 \leq t \leq \pi/2.$$

c) Explain your answers.

(3) Problem 23 on page 258 in the book.

(4) Let $c(t) = (2t, t + 3, t^2 + 1)$ be a possible flow line for a velocity vector field. Which of the following, if any, could be such a velocity vector field?

$$a) F(x, y, z) = (2, x - 2y + 7, x)$$

$$b) F(x, y, z) = (\sqrt{z - 1} - y + 5, 1, 2y - 6)$$

(5) Problem 28 on page 315 in the book.