

## Homework 4, Calc III

Due March 6th, 2009

1. Find the domain of the function and sketch it on the  $xy$ -plane.

(a)  $f(x, y) = \sqrt{xy}$ .

(b)  $f(x, y) = \sqrt{y^2 - x^2} \ln(y + x)$ .

2. Find the limit or explain why it doesn't exist

(a)

$$\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 \sin^2(y)}{x^2 + y^2}.$$

(b)

$$\lim_{(x,y) \rightarrow (\pi,0)} \frac{xy}{y - \cos(x)}.$$

3. Find all the first partial derivatives of the functions

(a)

$$f(x, y) = e^{2xy} - \sin(x) \cos(x + y).$$

(b)

$$f(x, y) = \arcsin(x\sqrt{y}).$$

4. Find all the second partial derivatives of

$$f(x, y) = \frac{xy}{x^2 - y}.$$

5. Find the linearization  $L(x, y)$  of the function at the given point

(a)

$$f(x, y) = \frac{x^2 - 4y}{x + 3y} \quad P(2, 2).$$

(b)

$$f(x, y) = e^{xy} \sin xy \quad P(0, \pi).$$