

Warm-up Problems - March 3, 2006

1. Identify each of the following
 - 1) Partial derivatives
 - 2) Second derivative test
 - 3) Lagrange multipliers
 - 4) Constraint, multiple constraints
 - 5) Method of least squares (for any function, not just a line)
 - 6) Residuals
 - 7) Formula for least square line
 - 8) Double integrals
 - 9) Average value of a function
 - 10) Solutions to differential equations
 - 11) Slope fields
 - 12) General solution, particular solution
 - 13) Initial value problem, initial condition
 - 14) Separation of variables

Lecture Problems

2. Let

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

Find f_y at the point $(1, 2)$.

3. Find the minimum of the function $f(x, y) = 2x^2 - 2xy + 3y^2 - 4x - 8y + 20$

4. Find and classify the critical points of the function $f(x, y) = x^2 + y^2 - 3xy$

5. For the data below, find the least squares regression line and predict a value for $y(10)$.

x	2	4	7	9
y	0	1	5	8

6. Find the average value of the function $f(x, y) = x^2y^3$ on the rectangle $0 \leq x \leq 2$, $-1 \leq y \leq 1$.

7. Find the minimum of $f(x, y) = x^2 + 2y^2$ subject to the constraint $x - 2y = 3$.

Do this 2 ways. Using Lagrange multipliers and without.

8. It is projected that $N(t)$, the total number of a new product sold, will grow in a way described by the equation

$$\frac{dN}{dt} = 0.1(M - N)$$

where M is some unspecified constant. After 10 months, it is found that $N(10) = 600$. What is the projected value for $N(20)$?