408L CLASS PROBLEMS

MARCH 11TH, 2020

Problem 1. Find f_x and f_y for $f(x, y) = \frac{x^2 y^3}{x + y^2}$.

Problem 2. Find f_x and f_y for $f(x, y) = \frac{xy}{\sin(x) + \cos(y)}$.

Problem 3. Find f_x and f_y for $f(x, y) = 11x^3 + y^2 - 11xy - 2y$. Evaluate $f_x(2, 12)$ and $f_y(2, 12)$. What might your answer tell you about the function $f(x, y)$ near $(2, 12)$?

Problem 4. A function $f(x, t)$ describes a wave at a position x and time t if it satisfies the *wave equation*:

$$f_{xx} = f_{tt}.$$

Which of the following functions satisfies the wave equation?

(1) $f(x, t) = \cos(x)\sin(t)$.
(2) $f(x, t) = e^{xt}$.
(3) $f(x, t) = e^{x+t}$.
(4) $f(x, t) = \sin(x + t)$.
(5) $f(x, t) = \log(\frac{x+t}{x-t})$.