MATH 432/530B FINAL

DUE MON 7 JUNE 76 12:30pm in 111 Love

1. Problems 26 & 27 Page 266

2. Show that $f: \mathbb{R}^n \to \mathbb{R}^m$ is continuous at $(a_1, a_2, \ldots, a_n)$ if f is differentiable there. (i.e. $Df|_{(a_1, a_2, \ldots a_n)}$ exists)

3. Suppose $T: \mathbb{R}^n \to \mathbb{R}^m$ is a linear map given by the $m \times n$ matrix $A = (a_{ij})$
show that $DT|_{\text{any point}} = A$

show that $D^2T = 0$-matrix (of the right size.)

4. If $f: \mathbb{R}^n \to \mathbb{R}$ is twice differentiable
find Df and D^2f (in terms of partials)
show that D^2f is a symetric matric.

5. If $\gamma: \mathbb{R} \longrightarrow \mathbb{R}^n$, Find an expression for $D^k\gamma$ for $k = 1, 2, 3, \ldots$

$$f = \begin{cases} \dfrac{xy}{x^2+y^2} & \neq (0,0) \\ 0 & = (0,0) \end{cases} \qquad f_x = \dfrac{y(x^2+y^2) - xy(2x)}{(x^2+y^2)^2} = \dfrac{y^3 - x^2y}{(x^2+y^2)^2}$$