

# MATH 14 WINTER 2004

## CALCULUS OF VECTOR-VALUED FUNCTIONS, HONORS

HOMEWORK FOR THE WEEK OF JANUARY 5 – JANUARY 9

DUE DATE: Friday, January 16 at the end of your section's lecture

1. Does the function

$$F(x, y) = \frac{x^3 + y^3}{x + y}$$

have a limit as  $(x, y)$  approaches  $(0, 0)$ ? Give a proof of your answer.

2. Does the function

$$G(x, y) = \frac{x^3 + y^3}{x - y}$$

have a limit as  $(x, y)$  approaches  $(0, 0)$ ? Give a proof of your answer.

3. Prove that  $A(B + C) = AB + AC$  where  $A$  is a 2 by  $n$  matrix and  $B$  and  $C$  are  $n$  by 3 matrices.

4. Prove that the inverse of the matrix  $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$  is  $\frac{1}{\det A} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$

**Optional Riddle:** Try to guess the inverse of  $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & a & b \\ 0 & c & d \end{bmatrix}$ .

How about  $A = \begin{bmatrix} a & 0 & b \\ 0 & c & 0 \\ d & 0 & e \end{bmatrix}$ ? And  $A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & k \end{bmatrix}$ ?

5. Exercise 2 p.73 from the textbook. Justify your answer.
6. Exercise 3 p.73 from the textbook. Justify your answer.