MATH 234, Lec. 2, EXAM #2

YOUR NAME

T.A.'s NAME

DISC. SEC. (Time and Day)

Show all your work. No calculators or references.

1.(20 points)	
2.(20 points)	
3.(20 points)	
4.(20 points)	
5.(20 points)	
Total	

1. Decide whether the following functions are continuous at (0,0). Justify your answer.

(a) $$f(x,y) = \begin{cases} \dfrac{x^2y}{2x^2 + y^2} & (x,y) \neq (0,0) \\ 0 & (x,y) = (0,0) \end{cases}$$

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

2. Find the equation of the plane which is tangent to the surface $z = \sinh(x^2 + y)$ at the point $(1,-1,0)$.

3. The temperature at any point in space is given by $T = xy + yz + zx$. (a) Find the direction in which the temperature increases most rapidly at the point (1,1,1) and determine the maximum rate of change at this point. (b) Find the derivative of T in the direction $3\hat{i} - 4\hat{k}$ at the point (1,1,1).

4. Find the absolute maximum and minimum for $f(x,y) = x^2 + 2y^2$ in the region $x^2 + y^2 \leq 1$.

5. Find the maximum and minimum values for the function $f(x,y,z) = x + 2y$ where (x,y,z) must satisfy the constraints $x + y + z = 1$ and $y^2 + z^2 = 4$.