Math 10A Midterm Winter 2011

Guan

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Your pledge: I pledge my honor that I have not violated the honor rule and done anything related to cheating during this examination.
                                                            Signature:

Math 10A Midtem

- This is a close book exam. The total points are 100+10

- In each problem, you have to show every step of your calculation.

Name:_____

ID Number:_____

1. (20 points) Find the first and the second order partial derivatives:

   (a) $f(x, y) = ye^{xy} + \cos(x + y)$.
   (b) $f(x, y, z) = xz - ye^{x+z}$.

2. (20+10 points) Are following functions continuous at $(0,0)$?

   (a) $f(x, y) = xy^{2011} - \sin 10y$.

   (b)
   $$f(x, y) = \begin{cases} \frac{xy}{x^2 + 10y^2} & \text{if} \quad (x, y) \neq (0, 0) \\ \frac{1}{11} & \text{if} \quad (x, y) = (0, 0). \end{cases}$$

   (c) (bonus problem)

   $$f(x, y) = \begin{cases} \frac{xy^{10}}{x^2 + y^2} & \text{if} \quad (x, y) \neq (0, 0) \\ 0 & \text{if} \quad (x, y) = (0, 0). \end{cases}$$

3. (15 points) Find the derivative matrix $Df(x, y)$ for $f(u, v) = (u + v, uv)$, $u = y - x$, $v = e^{x+y}$.

4. (15 points) Find a normal vector of the plane passing through the line $x = 1 - 2t, y = 10t + 2, z = 2 + t$ and the point $(1, 0, 0)$.

5. (15 points) Find

   (a) the distance between $A = (2, 1, 2)$ and $B = (2, 3, 6)$,

   (b) and the angle between A and B.

6. (15 points) Let $f(x, y) = x^2 - y^2$, find the graph of f.