Due Date: July 5, 2010, Monday NAME:..
Time: 10:30
Ali Sinan Sertöz STUDENT NO:..

Math 102 Calculus II – Homework I

1	2	3	4	TOTAL
25	25	25	25	100

Please do not write anything inside the above boxes!

PLEASE READ:
Check that there are 4 questions on your booklet. Write your name on the top of every page. Show your work in reasonable detail. A correct answer without proper reasoning may not get any credit.

Q-1) Consider the function

$$f(x,y) = \begin{cases} \dfrac{x^5 + y^6}{(x^2+y^2)^\alpha} & \text{if } (x,y) \neq (0,0), \\ \\ 0 & \text{if } (x,y) = (0,0). \end{cases}$$

Find all value of $\alpha \in \mathbb{R}$ such that both $f_x(0,0)$ and $f_y(0,0)$ exist. Calculate $f_x(0,0)$ and $f_y(0,0)$ for all such values of α.

NAME: STUDENT NO:

Q-2) Assume that $3z + x + y^2 + xz^3 = 13$ defines z as a C^2 function of x and y around the point $(x, y, z) = (3, 2, 1)$. Find the values of z_x, z_y, z_{xy}, z_{yx}, z_{xx} and z_{yy} at the point $(x, y, z) = (3, 2, 1)$.

NAME: STUDENT NO:

Q-3) Let S be the surface in $\mathbb{R}^3$ given by $f(x, y, z) = 0$ where $f(x, y, z) = 1+x^2+y^4-z$. Let $p_0 = (1/2, y_0, z_0)$ be a point on the surface such that the tangent plane to the surface S at p_0 passes through the origin. Find z_0.

NAME: STUDENT NO:

Q-4) Let $F(x) = \int_{x^4}^{x^3} \sqrt{t^3 + x^2}\, dt$. Calculate $F'(x)$ and find explicitly the values of $F'(0)$ and $F'(1)$.

Hint: Assume that you can differentiate under the integral sign; see the last few problems at the end of the section on "The Chain Rule" of Thomas' Calculus.