Mathematics 2401N **Test 3** **29 October 2007 VERSION** ⇑

NAME: _____

TA: _____

Instructions: Work absolutely on your own, without reference to notes or text. Answers should be as specific as possible and it should be evident how they were obtained. Write the answers where indicated

This test will end promptly at 9:55. Sign below and await the signal to begin the test.

I am familiar with the Georgia Tech Honor Code and will abide by it. Any stored information about MATH 2401 has been erased from my calculator (or similar storage device)

_____

1. (10 points)

Let $f(x, y) := x^2 + 2x + y^2$.

a) Does this function have an absolute maximum on the $x - y$ plane? (_____Y _____N) If

so, it is located at _____ and its value is _____.

b) Does this function have an absolute minimum on the $x - y$ plane? (_____Y _____N) If

so, it is located at _____ and its value is _____.

c) Does this function have any additional local maxima, local minima, or other critical

points? (_____Y _____N) If so, state the kind(s) of critical points, and their locations

HERE:

2. (10 points) Let $f(x, y) := x^2 + 2x + y^2$ as above, but restrict the function to the set

$\Omega = \{(x, y) : 3x^2 + 2y^2 \leq 84\}$.

a) Does this function have an absolute maximum on Ω? (_____Y _____N) If so, it is located

at _____ and its value is _____.

b) Does this function have an absolute minimum on Ω? (_____Y _____N) If so, it is located

at _____ and its value is _____.

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3. (10 points) Find the volume of the figure whose base is the portion of the first quadrant

   of the $x - y$ plane bounded by the line $y = 2 - 2x$ and having height $h(x, y) = 3xy^3$.

   TWO DIFFERENT SPECIFIC INTEGRALS FOR THE VOLUME ARE:

   a)

   $$Vol = \int_{_____}^{_____} \int_{_____}^{_____} _____d_____d_____$$

   and

   b)

   $$Vol = \int_{_____}^{_____} \int_{_____}^{_____} _____d_____d_____$$

   c) THE VOLUME EQUALS: _____

4. (10 points) Find the centroid of the quarter disk in the fourth quadrant, $\Omega = \{(x, y) :$

   $0 \le \sqrt{x^2 + y^2} \le 4, x \ge 0, y \le 0\}$.

   WRITE A SPECIFIC EXPRESSION, INVOLVING AN INTEGRAL OR INTEGRALS

   FOR THE ANSWER HERE:

   _____

   THE CENTROID IS: _____

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