SPRING 2008 — MA 227—- TEST 3
APRIL 2, 2008

Name: ____

1. Part I

There are 6 problems in Part 1, each worth 4 points. Place your answer on the line to the right of the question. Only your answer on the answer line will be graded.

(1) Evaluate $\int_0^1 \int_0^2 (2xy + 7x)\, dy\, dx$.

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(2) Evaluate $\iint_D y dA$ where D denotes the triangle with the vertices $(0,0), (0,1), (1,0)$.

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(3) Evaluate $\iint_D x\, dA$, where D is the region bounded by the lines $x = 0$ and $y = 0$ and $x^2 + y^2 = 16$ and satisfying conditions: $x \geq 0, y \geq 0$.

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(4) Find the mass of the lamina bounded by the lines $y = x^2, x = 1, y = 0$ provided the density is $\rho(x, y) = 2$.

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(5) Find rectangular coordinates of the point with cylindrical coordinates $r = 2$, $\theta = \pi/6$, and $z = 3$.

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(6) Sketch the domain D and change the order of integration in the iterated integral:

$\int_0^4 (\int_0^{\sqrt{y}} f(x,y)\,dx)\,dy$.

2. Part II

There are 3 problems in Part 2, each worth 12 points. Partial credit is awarded where appropriate. Your solution must include enough detail to justify any conclusions you reach in answering the question.

(1) Let D be the bounded domain which is enclosed by the curves $y = x^2$ and $y = x^3$ in the 1-st quadrant.
  (a) Sketch the domain.
  (b) Describe the domain with inequalities.
  (c) Calculate the double integral $\iint_D xy\, dA$ turning it into an iterated integral.

(2) Sketch the solid E and evaluate the triple integral $\iiint_E y^2 z^3 \, dV$, where E is the region in the half-space $y \geq 0$ bounded by the cylinder $x^2 + y^2 = 4$ and two planes $z = 0$ and $z = 2$.

(3) Calculate the triple integral $\iiint_E z^2 \, dV$ using the spherical coordinates, where E is the solid inside the ball $x^2 + y^2 + z^2 = 1$ and satisfying $y \geq 0$.