MATH 251, SPRING 2011
EXAM II - VERSION B

LAST NAME (print)___________________________ FIRST NAME : ________________________

UIN: ____________________________________SEAT#: ________

DIRECTIONS:

- The use of a calculator, laptop or computer is prohibited.
- In all problems present your solutions in the space provided.
- Be sure to read the instructions to each problem *carefully*.
- Use a pencil and be neat. If I can't read your answers, then I can't give you credit.
- *Show all your work* and *clearly indicate your final answer*. You will be graded not merely on the final answer, but also on the quality and correctness of the work leading up to it.
- SCHOLASTIC DISHONESTY WILL NOT BE TOLERATED.

THE AGGIE CODE OF HONOR

"An Aggie does not lie, cheat or steal, or tolerate those who do."

Signature: ____

Good Luck!

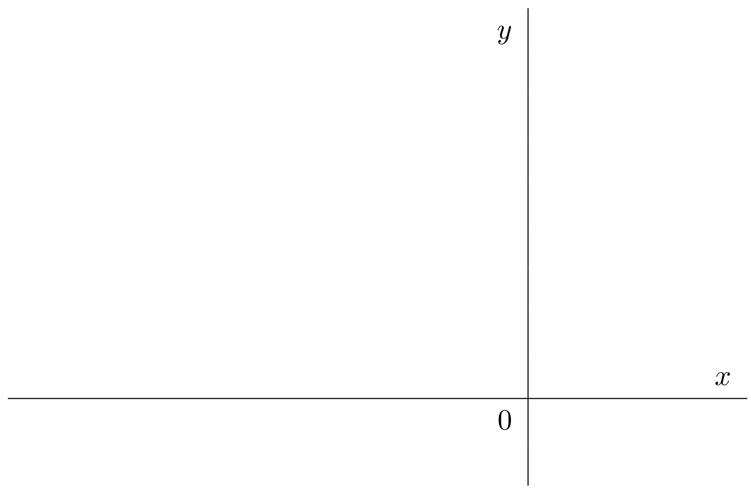
DO NOT WRITE BELOW!

GRADE:

1. Given

$$\iint_D f(x,y)\,\mathrm{d}A = \int_{-6}^{-2}\int_0^{x+6} f(x,y)\,\mathrm{d}y\mathrm{d}x + \int_{-2}^{0}\int_0^{x^2} f(x,y)\,\mathrm{d}y\mathrm{d}x.$$

(a) sketch the region of integration D.



(b) change the order of integration.

WRITE YOUR ANSWER HERE:

2. Find the mass of the lamina that occupies the region $D = \left\{(x,y) : x^2 + y^2 \le 2x,\ y \ge 0\right\}$ and has the density $\rho(x,y) = y$.

3. Find the volume of the paraboloid $z = x^2 + y^2$ below the paraboloid $z = 8 - 3(x^2 + y^2)$.

4. Let $f(x, y) = 3y - 2xy + 1$. Find the absolute maximum and minimum values of f on the region D bounded by the curves $y = x^2$ and $y = 3x$.

5. Find an equation for the tangent plane to the ellipsoid $2x^2 + y^2 + z^2 = 4$ at the point $(1, 1, 1)$.

6. Given $z = \dfrac{16}{\sqrt{y - x^2}}$.

   (a) Find the gradient of the given function.

   (b) Find the maximum rate of change of the function at the point $(2, 8)$.

   (c) Find the directional derivative of the given function at the point $(2, 8)$ in the direction of the vector $\mathbf{u} = \langle 4, -3 \rangle$.

   (d) Find the direction in which the maximum rate of change of the function at the point $(8, 2)$ occurs.

7. Given the function $f(x, y) = (x^2 + y^2)e^x - 2011$.

   (a) Locate the critical points.

   (b) Classify the critical points of f (i.e. local maximum, local minimum or saddle).