Math 2220
Prelim 2

March 31, 2011

Name: _____

TA's name: _____

Discussion: _____

INSTRUCTIONS — READ THIS NOW

- This test has **6** problems on 9 pages (counting this one and two blank pages at the end) worth a total of 100 points.
- Write your name, your TA's name, and your discussion section number **right now**.
- Show your work/explanation. To receive full credit, your answers must be neatly written and logically organized. If you need more space, write on the back side of the preceding sheet, but be sure to clearly label your work.
- This is a *closed-book* test. Notes, books, "cheat sheets", cell phones, and personal audio players are NOT allowed. Calculators are neither needed nor permitted.
- This is a **90** minute test.

OFFICIAL USE ONLY		
1.	_____	/20
2.	_____	/20
3.	_____	/15
4.	_____	/15
5.	_____	/15
6.	_____	/15
Total:	_____	/100

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Question 1 (20pts): Let $f(x,y) = y^2e^{y^2}$ and let D be the region in the xy-plane which is bounded by the lines $y = \frac{x}{2}$, $y = x$, and $y = a$ (where $a > 0$).

(a) Set up two iterated integrals for $\iint_D f(x,y)dA$. (i.e. one where you integrate in x first and one where you integrate in y first).

(b) Evaluate one of the integrals from part (a).

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Question 2 (20pts): Consider the following integral

$$\int_0^1 \int_{\sqrt[3]{z}}^1 \int_0^{\ln 3} \frac{\pi e^{2x} \sin(\pi y^2)}{y^2} dxdydz$$

(a) Sketch the region being integrated over.

(b) Evaluate the integral by changing the order of integration in an appropriate way.

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Question 3 (15pts): Compute the area of region outside $r = 4\sin\theta$ and inside $r = 2\sqrt{2}$, here $r \geq 0$. (Hint: $\cos 2\theta = 1 - 2(\sin\theta)^2$.)

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Question 4 (15pts): Find the volume of the solid that lies under the paraboloid $z = x^2 + y^2$, above the xy-plane, and inside the cylinder $x^2 + y^2 = 2x$.

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Question 5 (15pts): Evaluate $\int\int\int_E \sqrt{x^2+y^2}dxdydz$, where E is the region bounded by the paraboloid $z = x^2 + y^2$ and the plane $z = 4$.

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Question 6 (15pts):

(a) Evaluate the integral $\iint_D \cos(x+y)dA$ where D is the region in the xy-plane bounded by the y-axis, the line $y = x$ and the line $y = \frac{\pi}{3}$.

(b) Using part (a) and Mean Value Theorem to show that there is some point (x_0, y_0) in D such that $\cos(x_0 + y_0) = \frac{9}{2\pi^2}$.

(For your convenience, $\cos(\pi/3) = \frac{1}{2}$ and $\cos(2\pi/3) = -\frac{1}{2}$.)

STOP. THIS IS THE LAST PAGE OF PROBLEMS.

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