Ma 227 **Exam I A** **10/3/13**

Name: ________________________________

Lecture Section: ______

I pledge my honor that I have abided by the Stevens Honor System. ___________________________________

You may not use a calculator, cell phone, or computer while taking this exam. All work must be shown to obtain full credit. Credit will not be given for work not reasonably supported. When you finish, be sure to sign the pledge.
There is a table of integrals on the last page of the exam.

Score on Problem #1 ________

#2a ________

#2b ________

#3 ________

#4 ________

Total Score ________

1 [25 **pts**.] Evaluate the integral

$$\iint_D e^{y^2}\, dA$$

where D is the triangle bounded by the lines $y = \frac{x}{2}, y = 2,$ and $x = 0.$ Sketch D.

2 a $\left[20\ \textbf{pts.}\right]$ Calculate the

$$\iint_R \sin\sqrt{x^2+y^2}\,dA$$

The region R is the disk $x^2+y^2 \le \pi^2$.

2 b $\left[15\ \mathbf{pts.}\right]$ Give an integral in rectangular coordinates for the surface area of the portion of the hemisphere

$x^2 + y^2 + z^2 = 25,\ z \geq 0$ that lies above the circular region $x^2 + y^2 \leq 9$ in the x, y –plane. Sketch the surface area to be found. DO NOT EVALUATE THIS INTEGRAL.

3 [25 **pts**.] Give a triple integral in cylindrical coordinates for the volume of the of the solid region cut from

the sphere

$$x^2 + y^2 + z^2 = 1$$

by the cylinder $r = 2\sin\theta$. Sketch the solid. DO NOT EVALUATE THIS INTEGRAL.

4 $\left[20 \text{ } \mathbf{pts.} \right]$ Give an integral expression in **spherical** coordinates for the volume of the solid that lies above

the cone $\phi = \frac{\pi}{6}$ and below the sphere $\rho = 2a\cos\phi$. Sketch the volume. *Do not evaluate this expression.*

Table of Integrals

$\int x \sin x dx = \sin x - x \cos x + C$
$\int x \cos x dx = \cos x + x \sin x + C$
$\int \sin^2 x dx = -\frac{1}{2} \cos x \sin x + \frac{1}{2} x + C$
$\int \cos^2 x dx = \frac{1}{2} \cos x \sin x + \frac{1}{2} x + C$
$\int \sin^3 x dx = -\frac{1}{3} \sin^2 x \cos x - \frac{2}{3} \cos x + C$
$\int \cos^3 x dx = \frac{1}{3} \cos^2 x \sin x + \frac{2}{3} \sin x + C$
$\int \sin^4 x dx = \frac{3}{8} x - \frac{3}{16} \pi - \frac{1}{4} \sin 2x + \frac{1}{32} \sin 4x + C$
$\int \cos^4 x dx = \frac{3}{8} x + \frac{1}{4} \sin 2x + \frac{1}{32} \sin 4x + C$
$\int t e^{at} dt = \frac{1}{a^2} e^{at} (at - 1) + C$
$\int t^2 e^{at} dt = \frac{1}{a^3} e^{at} \left(a^2 t^2 - 2at + 2 \right) + C$