

Ma 227

Exam I A

10/4/12

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

$$\int_0^2 \int_x^2 e^{y^2} dy dx$$

Sketch the region of integration.

2 a [20 pts.] Evaluate

$$\iint_R (x^2 + y^2) dA$$

where R is the circle $x^2 + y^2 = 2x$. Sketch R .

2 b [15 pts.] Give an integral in polar coordinates for the surface area of the part of the hyperboloid $z = xy$ that lies within the cylinder $x^2 + y^2 = 1$. DO NOT EVALUATE THIS INTEGRAL.

3 [20 pts.] Use cylindrical coordinates to set up an iterated triple integral for the volume of the solid that lies within both the cylinder $x^2 + y^2 = 1$ and the sphere $x^2 + y^2 + z^2 = 4$. DO NOT EVALUATE THIS INTEGRAL.

4 [20 pts.] Use spherical coordinates to evaluate

$$\int_{-2}^2 \int_0^{\sqrt{4-y^2}} \int_{-\sqrt{4-x^2-y^2}}^{\sqrt{4-x^2-y^2}} y^2 \sqrt{x^2 + y^2 + z^2} \, dz dx dy$$

Table of Integrals

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