Name:______________________________

Math 2443 Section 170 *Practice Exam 2* *May 5, 2014*

Follow the instructions for each question and show enough of your work so that I can follow your thought process. If I can't read your work or answer, you will receive little or no credit!

For problems 1 - 6, compute the following double integrals:

1. $\displaystyle\int_0^{\sqrt{\pi}} \int_y^{\sqrt{\pi}} \cos(x^2)\; dx\; dy$

2. $\displaystyle\int_0^1 \int_{\sin^{-1} y}^{\frac{\pi}{2}} \cos x\sqrt{1+\cos^2 x}\; dx\; dy$

3. $\displaystyle\int\int_R \frac{y^2}{x^2+y^2}\, dA$ where $R = \{(x, y) : 1 \le x^2 + y^2 \le 4\}$.

4. $\displaystyle\int\int_D \cos\sqrt{x^2+y^2}\, dA$ where D is the disk with center the origin and radius 2.

5. $\displaystyle\int\int_D xy^2\, dA$ where D is the quarter of the disk in the first quadrant with center the origin and radius 2.

6. $\displaystyle\iint_D x\ dA$ where D is the region in the first quadrant that lies between the circles $x^2+y^2=4$ and $x^2+y^2=2x$.

For problems 7 - 12, compute the following triple integrals:

7. $\displaystyle\iiint_E \frac{z}{x^2+z^2}\ dV$ where $E=\{(x,y,z): 1\leq y\leq 4, y\leq z\leq 4, 0\leq x\leq z\}$.

8. $\displaystyle\iiint_E y\ dV$ where $E=\{(x,y,z): 0\leq x\leq 3, 0\leq y\leq x, x-y\leq z\leq x+y\}$.

9. $\displaystyle\iiint_E \sqrt{x^2+y^2}\, dV$ where E is the region that lies inside the cylinder $x^2+y^2=16$ and between the planes $z=-5$ and $z=4$.

10. $\displaystyle\iiint_E (x+y+z)\, dV$ where E is the solid in the first octant that lies under the paraboloid $z=4-x^2-y^2$.

11. $\displaystyle\iiint_E (x^2+y^2+z^2)^2\, dV$ where E is the ball with center the origin and radius 2.

12. $\displaystyle\iiint_E xe^{x^2+y^2+z^2}\, dV$ where E is the portion of the unit ball $x^2+y^2+z^2 \le 1$ that lies in the first octant.

13. The following integral is an improper integral on the cube $[0,1]\times[0,1]\times[0,1]$

$$\int_0^1\int_0^1\int_0^1 \frac{1}{1-xyz}\, dx\; dy\; dz$$

Show that one has the following:

$$\int_0^1\int_0^1\int_0^1 \frac{1}{1-xyz}\, dx\; dy\; dz = \sum_{n=1}^{\infty}\frac{1}{n^3}$$