1-4	/40
5	/15
6	/15
7	/15
8	/15

Name____________________ ID____________ Section______

MATH 253 Honors EXAM 2 Fall 2002

Sections 201-202 P. Yasskin

Multiple Choice: (10 points each) Work Out: (15 points each)

1. Compute $\int_0^2 \int_x^{2x} xy\,dy\,dx$.

a. 2
b. 4
c. 6
d. 8
e. 10

2. Compute $\iint \sin(x^2+y^2)\,dx\,dy$ over the region in the first quadrant between the circles $x^2+y^2=\pi$ and $x^2+y^2=2\pi$.

a. $-\frac{\pi}{2}$
b. $\frac{\pi}{2}$
c. $-\frac{\pi}{4}$
d. $\frac{\pi}{4}$
e. $\frac{\pi^2}{4}$

3. Find the mass of the upper half ($z \geq 0$) of the cylinder $x^2 + z^2 \leq 4$ for $0 \leq y \leq 3$ if the density is $\delta = 6z$.

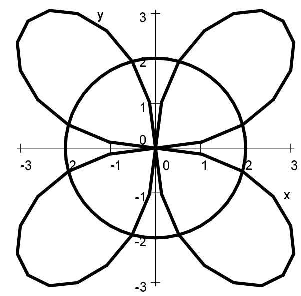
a. 24π
b. 36π
c. 24
d. 36
e. 96

4. Compute $\int_0^2 \int_x^2 \frac{x}{1+y^3}\, dy\, dx$.

a. $\frac{1}{2} \ln 9$
b. $\frac{1}{3} \ln 9$
c. $\frac{1}{6} \ln 9$
d. $\frac{1}{6} \ln 3 - \frac{1}{6}\pi\sqrt{3} + \frac{2}{9}$
e. $\frac{1}{6} \ln 3 + \frac{1}{6}\pi\sqrt{3} + \frac{2}{9}$

5. (15 points) Find the point in the first octant on the graph of $xy^2z^3 = 2$ which is closest to the origin. You must use Lagrange multipliers.

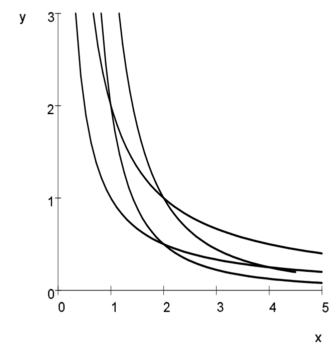
6. (15 points) Find the area inside one petal of the 4-petal rose $r = 4\sin(2\theta)$ but outside the circle $r = 2$.



7. (15 points) Consider the upper half ($z \geq 0$) of the sphere $x^2 + y^2 + z^2 \leq 4$. Find the mass and center of mass of the hemisphere if the density is $\delta = 5z$. Use symmetry where appropriate.

8. (15 points) Compute $\iint_R x^2 y \, dx\, dy$ over the diamond shaped region R bounded by

$$y = \frac{1}{x}, \qquad y = \frac{2}{x}, \qquad y = \frac{2}{x^2}, \qquad y = \frac{4}{x^2}$$



FULL CREDIT for integrating in the curvilinear coordinates $u = xy$ and $v = x^2 y$. (Solve for x and y.)

HALF CREDIT for integrating in rectangular coordinates.