1-4	/20
5	/20
6	/21
7	/23
8	/22

Name_____ ID_____ Section_____

MATH 253 Honors   EXAM 2   Spring 1999

Sections 201-203   P. Yasskin

Multiple Choice: (5 points each)

1. Compute: $\displaystyle\int_0^1 \int_{y^3}^{y} e^{x/y}\, dx\, dy$.

   a. $\dfrac{1}{2}e^2 - 1$

   b. $e + \dfrac{1}{2}$

   c. $e - \dfrac{1}{2}$

   d. $\dfrac{1}{2}$

   e. $\dfrac{3}{2}$

2. Compute $\displaystyle\iint \sin(x^2 + y^2)\, dA$ over the region inside the circle $x^2 + y^2 = \pi$.

   a. $\dfrac{\sqrt{\pi}}{2}$

   b. $\sqrt{\pi}$

   c. $\dfrac{\pi}{2}$

   d. π

   e. 2π

1

3. Compute: $\int_0^1 \int_{\sqrt{y}}^1 \frac{3}{1 + x^3} \, dx \, dy.$

    a. $\ln 2$

    b. $\ln 3$

    c. $3 \ln 2$

    d. $2 \ln 3$

    e. $\frac{3}{2}$

4. Find the volume between the paraboloids $\quad z = 18 - x^2 - y^2 \quad$ and $\quad z = x^2 + y^2.$

    a. 36π

    b. 81π

    c. 162π

    d. $\frac{243}{2}\pi$

    e. 243π

5. (20 points) Find the point in the **first octant** on the sphere $x^2 + y^2 + z^2 = 9$ at which the function $f = x^4 y^3 z^2$ is a maximum.
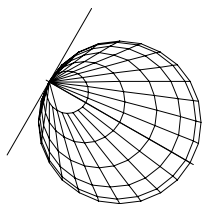
6. (21 points) The heart shape below is the graph of the polar equation $r = |\theta|$ for $-\pi \leq \theta \leq \pi$.   Find the area and the centroid. (16 points for formulas)
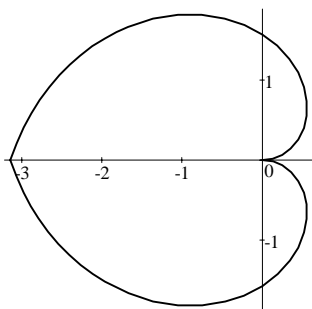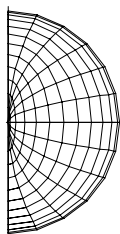
7. (23 points) Find the volume and the centroid of the half of the cone $\sqrt{x^2 + y^2} \leq z \leq 4$ for $y \geq 0$. (15 points for formulas)
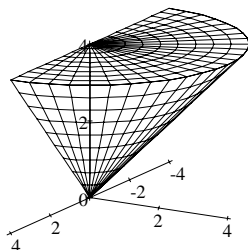
8. (22 points) The graph of the spherical equation $\rho = \sin\theta$ for $0 \leq \theta \leq \pi$ is shown from the positive z-axis, the positive x-axis, the positive y-axis and in perspective. Find the volume and centroid. (17 points for formulas)
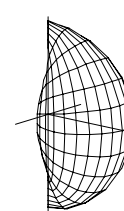
z-axis x-axis y-axis   perspective