Name: ________________________________

1. Consider the integral $\int_0^1 \int_{4x}^4 f(x,y)\,dy\,dx$. Sketch the region of integration, and reverse the order of integration.

12 pts

2. Consider the integral $\int_{-a}^{a} \int_0^{\sqrt{a^2-y^2}} (x^2+y^2)^{3/2}\,dx\,dy$. Sketch the region of integration, and convert the integral to polar coordinates. **Do not evaluate the integral.**

13 pts

(OVER)

3. Consider the integral $\int_0^{\pi} \int_0^{2\cos\theta} \frac{1}{\sqrt{4-r^2}}\, r\, dr\, d\theta$. Sketch the region of integration, and evaluate the integral.

12 pts

4. Set up an iterated integral for the **surface area** of the part of the cone $z^2 = a^2(x^2 + y^2)$ between the planes $z = 1$, and $z = 2$. **Do not evaluate the integral.**

13 pts

5. Evaluate the iterated integral $\int_0^1 \int_0^y \int_x^1 6xyz \, dz \, dx \, dy$.

12 pts

6. Set up a **triple integral** for the volume of the solid E bounded by the cylinder $x^2 + y^2 = 4$ and the planes $z = 0$ and $y + z = 3$. **Do not evaluate the integral.**

13 pts

(OVER)

7. Consider the solid E in the first octant that lies between the spheres of radius 1 and radius 2. Set up the triple integral of an arbitrary continuous function $f(x, y, z)$ in cylindrical or spherical coordinates over E.

13 pts

8. Sketch the vector field $\mathbf{F} = y\mathbf{i} + \mathbf{j}$. (**Every** dot in the figure must be the tail of a vector you draw.) You may like to support your work with a table of values.

12 pts