1. Integrate: $\displaystyle\int_0^1 \int_0^{1+\cos x} \sqrt{x+\sin x}\, dy\, dx.$

2. Let R be the triangle with vertices at $(-1,0)$, $(1,0)$ and $(0,1)$. Express $\displaystyle\int\int_R f(x,y)\, dA$ as an iterated integral in each of the two possible orders of integration. Do not evaluate the integrals. (Note: in one order, it will be written as a sum of two iterated integrals.)

3. Draw the region of integration and rewrite the integral, changing the order of integration. (Do not evaluate the new integral.)

$$\int_0^2 \int_{x^2}^{2x} f(x,y)\, dy\, dx.$$

4. Let D be the disk of radius 1 about $(0,0)$. Evaluate using polar coordinates:

$$\int\int_D \sqrt{1+x^2+y^2}\, dA.$$

5. Find $\displaystyle\int\int\int_E 2\, y\, z\, dV$ where E is the region of space bounded by the vertical planes $x=0$, $y=0$ and $y=2-2x$, bounded on the bottom by the x-y-plane and bounded on top by the surface $z=\sqrt{x+y}$.

6. Suppose E is the region in space bounded by the planes $z=0$, $x=0$, $y=1$ and the surfaces $y=x^2$ and $y=z^3$. Find the limits when this integral is written in the indicated orders:
   a. $\displaystyle\int_?^? \int_?^? \int_?^? f(x,y,z)\, dx\, dy\, dz$
   b. $\displaystyle\int_?^? \int_?^? \int_?^? f(x,y,z)\, dz\, dx\, dy$
   c. (Hard) How do you write this integral in the order $\int\int\int f(x,y,z)\, dy\, dz\, dx$?

7. Use spherical coordinates to compute $\displaystyle\int\int\int_E z\, dV$, where E is the region of space inside the cone $\phi=\frac{\pi}{4}$ and between the spheres $\rho=1$ and $\rho=2$.

8. Suppose a piece of wire has parametric representation $\gamma(t)=(\cos t, 2\sin t)$, $t\in[0,\pi]$ and the density of the wire is $\delta(x,y)=xy$ (units of mass per unit length). What is the weight?