SA16
Math 112, Spring 2006

You may find the following definite integrals useful. (I.e., these are given.)

$$\int_0^{2\pi} \sin^2 x\,dx = \int_0^{2\pi} \cos^2 x\,dx = \pi,$$
$$\int_0^{\pi/2} \sin^2 x\,dx = \int_{\pi/2}^{\pi} \sin^2 x\,dx = \int_{\pi}^{3\pi/2} \sin^2 x\,dx = \int_{3\pi/2}^{2\pi} \sin^2 x\,dx = \frac{\pi}{4},$$
$$\int_0^{\pi/2} \cos^2 x\,dx = \int_{\pi/2}^{\pi} \cos^2 x\,dx = \int_{\pi}^{3\pi/2} \cos^2 x\,dx = \int_{3\pi/2}^{2\pi} \cos^2 x\,dx = \frac{\pi}{4}.$$

1. (6.2) 4(a).

2. (6.2) 16.

3. Let D be the region in $\mathbb{R}^2$ given by $x^2 + y^2 \leq 4$, $x \geq 0$, $y \geq 0$. Draw D, and calculate

$$\iint_D (x^2 + xy)\,dx\,dy$$

using polar coordinates.

4. Let E be the cylinder of radius 3 with center the z axis and $0 \leq z \leq 4$. Draw E, and calculate

$$\iiint_E (\sin z)(x + y + 2)\,dx\,dy\,dz$$

using cylindrical coordinates.

5. Let E be the upper hemisphere of radius 5 centered at the origin. Draw E, and calculate

$$\iiint_E z(x^2 + y^2)\,dx\,dy\,dz$$

using spherical coordinates.