ANSWERS TO REVIEW PROBLEMS

A. Approximating Integrals

1. 41.4 (approximate answer, depends on what you estimated the values at the midpoints to be)
2. (a) ≈ 0.555 (b) ≈ 0.513 (c) $= 0.50$
3. (a) $= 0.0625$ (b) $= 0.078125$ (c)≈ 0.083333

B. Double and Triple Integrals

1. (a) Chapter 16 Review, Exercises.

   #10: $\displaystyle\int_0^4 \int_{y-4}^{4-y} f(x,y)dxdy$

   #12: the region between the two spheres centered at the origin of radius 1 and 2, in the first octant.

   #30: $\displaystyle\int_0^1 \int_{y+1}^{4-2y} \int_0^{x^2 y} dzdxdy = 2.5$

   #42: $\displaystyle\int_0^{\pi/2} \int_0^{\pi/2} \int_0^1 \rho^6 \sin\phi d\rho d\phi d\theta = \frac{\pi}{14}$

   (b) Section 16.8

   # 24: $\displaystyle\int_0^{2\pi} \int_{\pi/4}^{\pi/2} \int_0^2 \rho^2 \sin\phi d\rho d\phi d\theta = \frac{8\sqrt{2}\pi}{3}$

2. $\frac{1}{2}\sin 1$
3. $9\pi/2$
4. $\displaystyle\int_0^{2\pi} \int_0^{\pi/6} \int_0^2 \rho^2 \sin\phi d\rho d\phi d\theta = \frac{16\pi}{3}(1-\sqrt{3}/2)$
5. $\displaystyle\int_0^2 \int_0^{1-y/2} \int_0^{2-2x-y} y\, dzdxdy = \int_0^2 \int_0^{2-z} \int_0^{1-y/2-z/2} y\, dxdydz = \int_0^2 \int_0^{1-z/2} \int_0^{2-2x-z} y\, dydxdz$
6. $(0,0,3a/8)$
7. $\displaystyle\int_0^{\pi/2} \int_0^3 \int_0^{\frac{r\cos\theta}{3}} dxrdrd\theta = 9$
8. $\displaystyle\int_0^{\pi/2} \int_0^1 \int_0^{2-r\cos\theta} r\sin\theta dxrdrd\theta = 5/12$
9. $16/3$
10. $\displaystyle\int_0^{2\pi} \int_0^{\pi/6} \int_0^2 \rho^2 \sin\phi d\rho d\phi d\theta = \int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_{\sqrt{3x^2+3y^2}}^{\sqrt{4-x^2-y^2}} dzdydx = \int_0^{2\pi} \int_0^1 \int_{\sqrt{3}r}^{\sqrt{4-r^2}} dzrdrd\theta$