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

B. Double and Triple Integrals
   
   #10: \(\int_0^4 \int_y^{4-y} f(x,y) \, dx \, dy\)
   
   #12: the region between the two spheres centered at the origin of radius 1 and 2, in the first octant.
   
   #30: \(\int_0^1 \int_0^{1-x} \int_y^{1-y} \, dz \, dx \, dy = 2.5\)
   
   #42: \(\int_0^{\pi/2} \int_0^{\pi/2} \int_0^{\rho} \rho^6 \sin \phi \, d\rho \, d\phi \, d\theta = \frac{\pi}{14}\)
   
   Section 16.8:
   
   # 24: \(\int_0^{2\pi} \int_0^{\pi/2} \int_0^{\rho} \rho^2 \sin \phi \, d\rho \, d\phi \, d\theta = \frac{8\sqrt{2}\pi}{3}\)

2. \(\frac{1}{3} \sin 1\)
3. \(9\pi/2\)
4. \(\int_0^{2\pi} \int_0^{\pi/6} \int_0^{\rho} \rho^2 \sin \phi \, d\rho \, d\phi \, d\theta = \frac{16\pi}{3} (1 - \sqrt{3}/2)\)
5. \(\int_0^2 \int_0^{1-y/2} \int_0^{1-z-y/2} y \, dz \, dx \, dy = \int_0^2 \int_0^{2-z} \int_0^{1-y/2-z/2} y \, dx \, dy \, dz = \int_0^2 \int_0^{2-z} \int_0^{1/2-2x-z} y \, dy \, dx \, dz\)
6. \((0, 0, 3a/8)\)
7. \(\int_0^{\pi/2} \int_0^3 \int_0^{r \sin \theta} d\rho \, d\rho \, dr \, d\theta = 3\)
8. \(\int_0^{\pi/2} \int_0^1 \int_0^{2-r \cos \theta} r \, \sin \theta \, dx \, dr \, d\theta = 5/12\)
9. 64/15
10. \(\int_0^{2\pi} \int_0^{\pi/6} \int_0^{\rho} \rho^4 \sin \phi \, d\rho \, d\phi \, d\theta = \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{4-x^2-y^2}} \int_0^{\sqrt{3x^2+3y^2}} dz \, dy \, dx = \int_0^{2\pi} \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{4-r^2}} d\rho \, d\phi \, d\theta\)