

Solutions to review problems for exam 2.

1. $\frac{1}{2}(e - 1)$;

2. $\frac{\pi}{8}\ln(5)$

3. a. $\int_{-\sqrt{2}}^{\sqrt{2}} \int_{-\sqrt{2-x^2}}^{\sqrt{2-x^2}} \int_{\sqrt{x^2+y^2}}^{\sqrt{4-x^2-y^2}} (x + 2y + z) dz dy dx$

b. $\int_0^{2\pi} \int_0^{\sqrt{2}} \int_r^{\sqrt{4-r^2}} (r\cos(\theta) + 2r\sin(\theta) + z) r dz dr d\theta$

c. $\int_0^{2\pi} \int_0^{\frac{\pi}{4}} \int_0^2 (\rho\cos(\theta)\sin(\phi) + 2\rho\sin(\theta)\sin(\phi) + \rho\cos(\phi)) \rho^2 \sin\phi d\rho d\phi d\theta$

4. $\pi/14$

5. $\int_0^{2\pi} \int_0^2 \int_{-\sqrt{16-r^2+6r\sin(\theta)}}^{\sqrt{16-r^2+6r\sin(\theta)}} r dz dr d\theta$

6. $4/5$

7. 2π