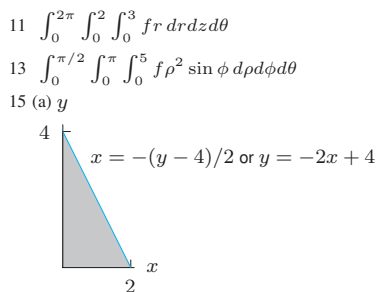
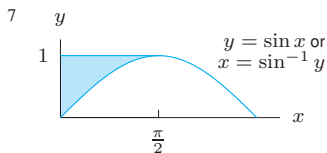
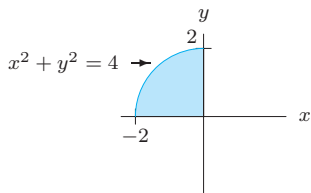


- 25 $a = 0, b = 1, c = 0, d = 1$
 27 True
 29 False

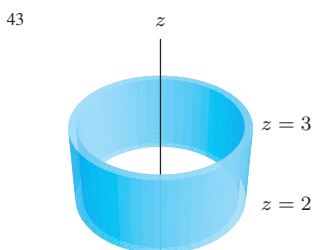
Chapter 16 Review

- 1 94.5
 3 14
 5

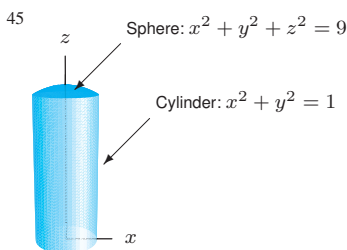


(b) $\int_0^2 \int_0^{-2x+4} g(x, y) dy dx$

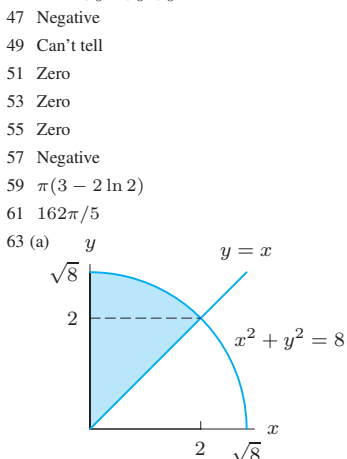
- 17 $10(e-2)$
 19 $(1/20) \sin^5 1$
 21 $(\pi/2)(1 - e^{-1})$
 23 1/48
 25 $\int_0^{2\pi} \int_{3\pi/4}^{\pi} \int_0^{\sqrt{2}} f(\rho, \phi, \theta) \rho^2 \sin \phi d\rho d\phi d\theta$
 27 $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_{-\sqrt{x^2+y^2}}^{\sqrt{x^2+y^2}} h(x, y, z) dz dy dx$
 29 Positive
 31 Positive
 33 Negative
 35 Zero
 37 Positive
 39 1.571
 41 (a) $\int_0^{2\pi} \int_{\pi/4}^{\pi/2} \int_0^{3/\sin \theta} \rho^2 \sin \phi d\rho d\phi d\theta$
 (b) 18π



$\int_0^{2\pi} \int_2^3 \int_{\sqrt{5}}^{\sqrt{6}} r dr dz d\theta$
 Order of integration can be changed



$\int_0^{2\pi} \int_0^1 \int_0^{\sqrt{9-r^2}} r dz dr d\theta$



- (b) $\pi(1 - e^{-8})/8$
 65 (a) $z = \sqrt{1 - (y-1)^2}$ $0 \leq y \leq 2$ $0 \leq x \leq 10$
 (b) $\int_0^{10} \int_0^2 \int_0^{\sqrt{1-(y-1)^2}} f(x, y, z) dz dy dx$
 67 (a) Half cylinder, radius 1, along x-axis, $y \geq 0, -1 \leq x \leq 1$
 (b) $2\pi/5$
 69 $\int_0^{2\pi} \int_0^4 \int_3^{\sqrt{25-r^2}} r dz dr d\theta = 52\pi/3 = 54.45 \text{ cm}^3$
 71 $\int_0^{2\pi} \int_0^{\arccos(3/5)} \int_{3/\cos \phi}^5 \rho^2 \sin \phi d\rho d\phi d\theta = 52\pi/3 = 54.45 \text{ cm}^3$
 73 $8\pi \text{ gm}$
 75 $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_{-1+\sqrt{2-x^2-y^2}}^{\sqrt{1-x^2-y^2}} dz dy dx = 2\pi((7/6) - 2\sqrt{2}/3)$

- 77 $8\pi R^5/15$
 79 (a) $3/2000$
 (b) $343/1000$
 81 $6\pi/7$
 83 $a, b + c, 0$

Section 17.1

- 1 $x = 0, y = t, -2 \leq t \leq 1$
 3 $x = t, y = 3 - 3t, 0 \leq t \leq 1$
 5 $x = 1 + 2t, y = 1 + t, 0 \leq t \leq 1$
 7 $x = t, y = 1, z = -t$
 9 $x = 1, y = 0, z = t$
 11 $x = 1 + 3t, y = 2 - 3t, z = 3 + t$
 13 $x = -3 + 2t, y = -2 - t, z = 1 - 2t$
 15 $x = 2 + 3t, y = 3 - t, z = -1 + t$
 17 $x = 3 - 3t, y = 0, z = -5t$
 19 $x = 3 \cos t, y = 3 \sin t, z = 5, 0 \leq t < 2\pi$
 21 $x = 2 \cos t, y = -2 \sin t, z = 0$
 23 $x = 2 \cos t, y = 0, z = 2 \sin t$
 25 $x = 0, y = 3 \cos t, z = 2 + 3 \sin t$
 27 $x = t^2, y = t, z = 0$
 29 $x = -3t^2, y = 0, z = t$
 31 $x = t, y = 4 - 5t^4, z = 4$
 33 $x = 3 \cos t, y = 2 \sin t, z = 0$
 35 $x = -1 + 3t, y = 2, z = -3 + 5t$
 37 $\vec{r}(t) = \vec{i} - 3\vec{j} + 2\vec{k} + t(3\vec{i} + 4\vec{j} - 5\vec{k}), 0 \leq t \leq 1, x = 1 + 3t, y = -3 + 4t, z = 2 - 5t, 0 \leq t \leq 1$
 39 $x = \cos t, y = \sin t, z = 0, 0 \leq t \leq \pi$
 41 Two arcs:
 $\vec{r}(t) = 5\vec{i} + 5(-\cos t\vec{i} + \sin t\vec{j}), 0 \leq t \leq \pi$ or
 $\vec{r}(t) = 5\vec{i} + 5(\cos t\vec{i} + \sin t\vec{j}), \pi \leq t \leq 2\pi$
 43 $\vec{r}(t) = (2 + 10t)\vec{i} + (5 + 4t)\vec{j}$
 45 $\vec{r}(t) = (2 + ((t-20)/10)10)\vec{i} + (5 + ((t-20)/10)4)\vec{j}$
 47 $\vec{r}(t) = (2 - 10t)\vec{i} + (5 - 4t)\vec{j}$
 49 No
 51 (b) $-\vec{i} - 10\vec{j} - 7\vec{k}$
 (c) $\vec{r} = (1-t)\vec{i} + (3-10t)\vec{j} - 7t\vec{k}$
 53 (a) $\vec{r} = (\vec{i} + 3\vec{j} + 7\vec{k}) + t(2\vec{i} - 3\vec{j} - \vec{k})$
 (b) $(3, 0, 6)$
 (c) $\sqrt{14}$
 55 (a) $2\vec{i} - 5\vec{j} + 3\vec{k}$
 (c) $x = 1 + 2t, y = -1 - 5t, z = 1 + 3t$
 57 Different lines
 59 Different lines
 61 (a) $(-1, 4, -2)$
 (b) $-\vec{i} - \vec{j} + 2\vec{k}$; other answers possible
 (c) $\vec{r} = -\vec{i} + 4\vec{j} - 2\vec{k} + t(-\vec{i} - \vec{j} + 2\vec{k})$
 63 $x = -\frac{3}{2}t + \frac{5}{2}, y = \frac{1}{2}t + \frac{1}{2}, z = t$
 65 $x = -4, y = 2 + t, z = 3 + t$
 67 (a) Straight lines
 (b) No
 (c) $(1, 2, 3)$
 69 (a) Repeats every year
 (b) Mid-August
 (c) Mid-April
 (d) 2°C per month
 71 Circle, cosine, sine