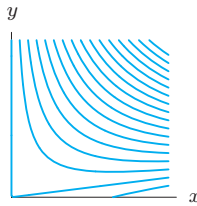
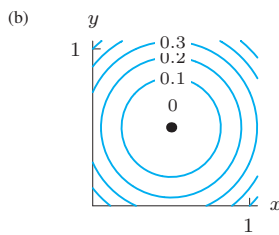
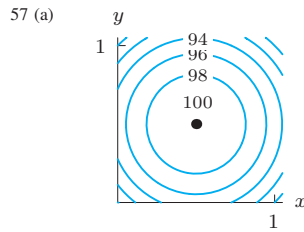


- 21  $\int_1^3 \int_{\frac{1}{2}(y-1)}^{-\frac{1}{2}(y-5)} f \, dx \, dy$
- 23  $\frac{4}{15}(9\sqrt{3} - 4\sqrt{2} - 1) = 2.38176$
- 25  $32/9$
- 27  $13/6$
- 29  $0$
- 31  $2/3$
- 33  $(e - 1)/2$
- 35  $\frac{2}{9}(3\sqrt{3} - 2\sqrt{2})$

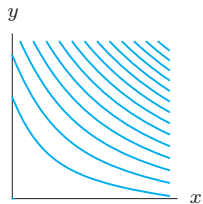
$f(x, y) = -3x^2 + 24xy:$



- 37  $\frac{1}{2}(e^2 - 1)$
- 39 (a)  $8/3$   
(b)  $16/3$
- 41 (a)  $\int_0^{1/2} \int_y^{1-y} f(x, y) \, dx \, dy$   
 $\int_0^{1/2} \int_0^x f(x, y) \, dy \, dx$   
 $\int_{1/2}^1 \int_0^{1-x} f(x, y) \, dy \, dx$   
(b)  $1/8$
- 43  $15$
- 45  $\int_{-5}^5 \int_{-\sqrt{25-y^2}}^{\sqrt{25-y^2}} (25 - x^2 - y^2) \, dx \, dy$
- 47  $\int_0^4 \int_{y-4}^{(4-y)/2} (4 - 2x - y) \, dx \, dy$
- 49  $1/3$
- 51  $16/3$
- 53 Volume =  $1/(6abc)$
- 55 (a) Circles centered at  $(1, 0)$   
(b)  $\int_{-\sqrt{3}}^{\sqrt{3}} e^{-y^2} \, dy$   
(c)  $\int_{-2}^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} e^{-(x-1)^2 - y^2} \, dy \, dx$



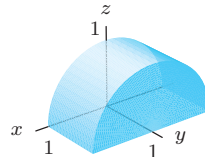
- 59 (a)  $(4/3)a + b + (4/3)c = 20$   
(b)  $f(x, y) = x^2 + \frac{44}{3}xy + 3y^2:$



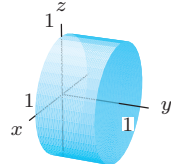
- 61  $k(a^3b + ab^3)/3$
- 63 Integrals not over same region
- 65  $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} 2 \, dx \, dy$
- + 67  $\int_0^2 \int_0^{6-3y} 1 \, dx \, dy$
- 69 False
- 71 False
- 73 False
- 75 False

**Section 16.3**

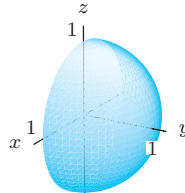
- 1  $2$
- 3  $-8$
- 5



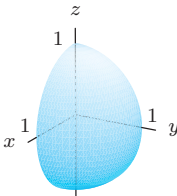
7



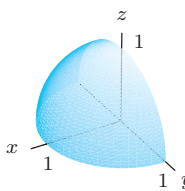
9



11



13



- 15 Positive
- 17 Positive
- 19 Zero
- 21 Positive
- 23 Zero
- 25 Positive
- 27 Positive
- 29  $125$

- 31 (a)  $2 \int_0^{10} \int_0^1 \int_y^1 e^{-3x} \, dz \, dy \, dx$   
Other answers are possible  
(b)  $(1 - e^{-30})/3$

33  $V = \int_0^1 \int_0^2 \int_{x+y}^{1+2x+2y} 1 \, dz \, dy \, dx$   
Can reverse order  $x, y$

35  $V = \int_0^1 \int_0^{1-x} \int_{6-3x-4y}^{6-2x-2y} 1 \, dz \, dy \, dx$   
Can reverse order  $x, y$

37  $V = \int_{-\sqrt{5}}^{\sqrt{5}} \int_{-\sqrt{5-x^2}}^{\sqrt{5-x^2}} \int_2^{\sqrt{9-x^2-y^2}} 1 \, dz \, dy \, dx$   
Can reverse order  $x, y$

39  $\int_0^1 \int_{-r}^r \int_0^{\sqrt{r^2-x^2}} f(x, y, z) \, dz \, dy \, dx$

41  $\int_{-r}^r \int_{-\sqrt{r^2-x^2}}^{\sqrt{r^2-x^2}} \int_0^{\sqrt{r^2-x^2-y^2}} f(x, y, z) \, dy \, dz \, dx$

43  $1/2$

45  $162$

47  $1$

49  $29 \text{ gm}$

51  $243$

53 (a)  $x + y + z = 1$

(b)  $1/6$

55  $\int_0^2 \int_0^{1-\frac{z}{2}} \int_0^{2-2y-\frac{z}{2}} f(x, y, z) \, dx \, dy \, dz$

57  $\int_{-4}^4 \int_{-\sqrt{16-x^2}}^{\sqrt{16-x^2}} \int_3^{\sqrt{25-x^2-y^2}} dz \, dy \, dx$

59  $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_{-\sqrt{1-z^2}}^{\sqrt{1-z^2}} dy \, dz \, dx$

61  $\int_0^2 \int_0^{6y^2} \int_0^{\sqrt{12-3y^2}} f(x, y, z) \, dx \, dz \, dy$

63  $4$

65  $m = 2;$

$(\bar{x}, \bar{y}, \bar{z}) = (13/24, 13/24, 25/24)$

67  $5m/3$

71 Need same limits on innermost integral

73  $f(x, y, z) = z$

75 True

77 True

79 False

81 True

83 True

**Section 16.4**

1  $\int_0^{\pi/2} \int_0^{1/2} f \, r \, dr \, d\theta$

3  $\int_{\pi/4}^{3\pi/4} \int_0^2 f \, r \, dr \, d\theta$