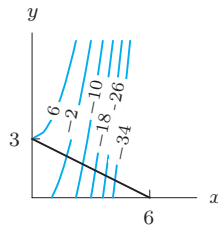


- 23 (a) $s = 1000 - 10l$
- 25 (a) Min; max at endpt of constraint
 λ neg
- (b) Max; min at endpt of constraint
 λ pos
- 27 $\Delta c/4; -\Delta c/4$
- 31 (a) $C = \$4349$
- (b) \$182
- 33 (a) $W = 225$
 $K = 37.5$
- (c) $W = 225$
 $K = 37.5$
 $\lambda = 0.29$

- 35 (a) No
- (b) Yes
- (c) $a + b = 1$
- 37 $x_1 = ((v_1)^{1/2} + (v_2)^{1/2}) / (m(v_1)^{1/2})$
 $x_2 = ((v_1)^{1/2} + (v_2)^{1/2}) / (m(v_2)^{1/2})$
- 39 (a) $f_1 = \frac{k_1}{k_1+k_2}mg, f_2 = \frac{k_2}{k_1+k_2}mg$
- (b) Distance the mass stretches the top spring and compresses the lower spring
- 43 (a) Cost of producing quantity u when prices are p, q
- (b) $2\sqrt{pq}u$
- 45 (a) $-5\lambda^2 + 15\lambda$
- (b) 1.5, 11.25
- (c) 11.25, 1.5
- (d) same
- 47 (a) $S = \ln(a^a(1-a)^{(1-a)}) + \ln b - a \ln p_1 - (1-a) \ln p_2$
- (b) $b = e^c p_1^a p_2^{(1-a)} / (a^a(1-a)^{(1-a)})$
- 49 Maximum value is 1
- 51 $f(x, y) = 3x + 4y$
- 53 $f(x, y) = x^2 + y^2$
- 55

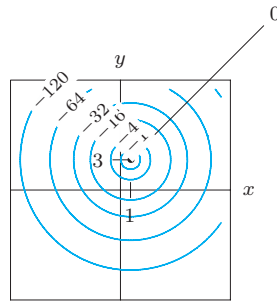


- 59 False
- 61 False
- 63 False
- 65 False
- 67 True
- 69 True

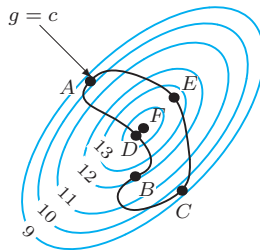
Chapter 15 Review

- 1 (3, -1), Saddle point

- 3 Saddle pt: (0, -5)
Local min: (2, -5)
- 5 (2, 1); local min
- 7 (2, 3): Local and global max
- 9 Local minimum: (1, 2)
Local maximum: (-1, -2)
Saddle points: (1, -2) and (-1, 2)
No global maximum or minimum
- 11 Minimum $f(-3/\sqrt{5}, 4/\sqrt{5}) = -5\sqrt{5}$,
Maximum $f(3/\sqrt{5}, -4/\sqrt{5}) = 5\sqrt{5}$
- 13 Min = 11.25; no max
- 15 Minimum $f(27.907, 23.256) = 1860.484$;
No maximum
- 17 Maximum = $f(48, 52) = 37,600$
No minimum
- 19 Max = 21, no min
- 21 No global extrema.
- 23 Maximum
- 25 Both
- 27 0.204
- 29 $\Delta c/2; \Delta c/(2\sqrt{2})$
- 31



- 33 (a) (i) Power function
(ii) Linear function
- (b) $\ln N = 1.20 + 0.32 \ln A$
Agrees with biological rule
- 35 (a) $2c^2/3$
- (b) $4c/3$
- (c) $\lambda = m'(c)$
- 37 $c \left(\frac{aK}{(a+b)P_1} \right)^a \left(\frac{bK}{(a+b)P_2} \right)^b$
- 39 (a) Points A, B, C, D, E
- (b) Point F
- (c) Point D



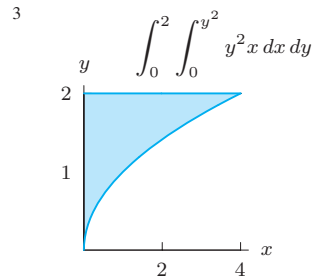
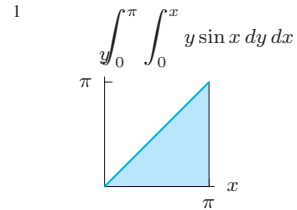
- 41 $f(x, y, z) = \frac{|Aa+Bb+Cc+D|}{\sqrt{A^2+B^2+C^2}}$
- 43 $K = 20$
 $L = 30$
 $C = \$7,000$

- 47 Base: 4 cm by 4 cm
Height: 2 cm
- 49 $-1/2$
- 51 (a) $x = 1/4 - a, y = 1$, saddle point
- 53 (a) 21.0208
- (b) $g = 20.5, 21.2211; g = 20.2, 21.1008$
- (c) $g = 20.5, 21.2198; g = 20.2, 21.1007$

Section 16.1

- 1 24; 43.5
- 3 Over: Approx 137
Under: Approx 60
- 5 about 2300
- 7 Positive
- 9 Zero
- 11 Zero
- 13 Positive
- 15 25.2°C
- 17 Need f nonnegative everywhere
- 19 $f(x, y) = 5 - x - y$; R is square with vertices $(\pm 1, \pm 1)$
- 21 False
- 23 False
- 25 True
- 27 True
- 29 False

Section 16.2



- 5 150
- 7 54
- 9 $e - 2$
- 11 $3 - \sin 3$
- 13 $(e^4 - 1)(e^2 - 1)e$
- 15 -2.678
- 17 $\int_1^4 \int_1^2 f dy dx$ or $\int_1^2 \int_1^4 f dx dy$
- 19 $\int_{-1}^3 \int_{-2}^{(1-3x)/4} f dy dx$
or $\int_{-2}^1 \int_{-1}^{(1-4y)/3} f dx dy$