

Answers to Even-Numbered Homework Problems

Lesson 1

Section 5.4

26. 5

28. $\frac{608}{15}$

Lesson 2

Section 5.5

8. $\frac{1}{5}e^{x^5} + C$

10. $-\frac{1}{2}e^{-t^2} + C$

20. $-\ln|1-x| + C$

24. $\frac{1}{3}\sin x^3 + C$

40. $\frac{1}{24(2-x^4)^6} + C$

Lesson 3

Section 5.5

48. $-\frac{1}{3}\cos^3 x + C$

56. $\frac{6561}{16}$

64. $-e^{-kb} + 1$, or $1 - \frac{1}{e^{kb}}$

70. $-\frac{21}{512}$

74. (a) $4,000,000(e^{2.475} - 1) \approx 43,526,828$

(b) $4,000,000(e^{2.475} - e^2) \approx 17,970,604$

Lesson 4

Section 5.6

2. $xe^{2x} - \frac{1}{2}e^{2x} + C$

4. $x \sin x + \cos x + C$

10. $\frac{x^4 \ln x}{4} - \frac{x^4}{16} + C$

16. $\left(\frac{x^2}{2} + x\right) \ln x - \frac{x^2}{4} - x + C$

Lesson 5

Section 5.6

34. $6 \ln 6 - 5$

38. $\frac{10\pi}{3} - \frac{5\sqrt{3}}{2}$

40. 251869

42. (a) $-e^{-kT} \left(\frac{T}{k} + \frac{1}{k^2}\right) + \frac{1}{k^2}$

(b) $-75e^{-2} + 25 \approx 14.850$ mg

56. left to the student

Lesson 6

Section 5.7

52. 30.025

Lesson 7

Section 5.8

Answers to Even-Numbered Homework Problems

2. 2π

10. $\pi \ln 4$

Lesson 8

Section 5.8

26. $\frac{3}{4}$

32. 100

Lesson 9

Section 5.9

8. divergent

28. $\frac{2}{e}$

34. $\frac{A}{k}$

36. The area is infinite.

Lesson 12

Section 7.1

4. 28, 5, 12

14. a)105, b)95

Lesson 13

Section 7.2

2. $3(x - y)^2, -3(x - y)^2, 3, -75$

6. 5, 7, 5, 7

12. $f_x = 2ye^{2xy}, f_y = 2xe^{2xy}$

16. $f_x = 5x^4 - 8xy^2 + 5y^3, f_y = -8x^2y + 15xy^2 - 2$

Lesson 14

Section 7.2

40. $f_{xx} = 4e^{2x-y}, f_{xy} = -2e^{2x-y},$
 $f_{yx} = -2e^{2x-y}, f_{yy} = e^{2x-y}$

46. $f_{xx} = 20x^3 - 8y^2, f_{xy} = -16xy + 15y^2,$
 $f_{yx} = -16xy + 15y^2, f_{yy} = -8x^2 + 30xy$

52. 8.2

Lesson 15

Section 7.3

2. Relative minimum at $\left(-\frac{5}{3}, \frac{10}{3}\right)$

6. Saddle at (0,0), relative minimum at (2,2)

12. Saddle at (0,0)

Lesson 16

Section 7.3

20. -3.5, no

22. Relative minimum at (1,2)

Answers to Even-Numbered Homework Problems

Lesson 18

Section 7.5

2. 1

8. $\frac{1}{2}e^4 - e^2 + \frac{1}{2}$

Lesson 19

Section 7.5

22. 760

Lesson 20

Section 8.1

4. $y = -5 \cos x - 4x + C$

10. $y = \cos x + x \sin x + C$

24. $y = \sin x - x \cos x + 3$

Lesson 21

Section 8.1

32. $y = \frac{1}{4}e^{2x} + 4x + \frac{15}{4}$

Lesson 22

Section 8.1

36. Slope is $\frac{1}{2}$

38. Slope is -2

Lesson 25

Section 8.2

4. $(-1, 2)$

8. $y = \frac{1}{2} + \frac{C}{e^{4x}}$

16. $y = \frac{\sin x}{x} - \cos x + \frac{C}{x}$

Lesson 26

Section 8.2

32. $y = 1 + 3e^{\frac{1}{t}-1}$

42. (a) $Y' + kY = 60k$

(b) $Y = 60 - 45e^{kx}$

(c) $k = \frac{1}{10} \ln \frac{39}{45} \approx -0.01431$

(d) 18.11

(e) 64.03 pounds per acre

48. $P(t) = 1 - e^{-1.2t}$

Lesson 27

Section 8.3

2. (a) $y = -\frac{4}{5}$

(b) unstable

(c) none

(d) left to the student

Lesson 28

Section 8.4

Answers to Even-Numbered Homework Problems

$$2. y = \sqrt[3]{\frac{5}{2}x^2 + C}$$

$$10. y = \pm \sqrt{\frac{3}{C - 2e^{t^3}}}, y = 0$$

$$12. \frac{1}{2}y^2 + \frac{1}{6}y^6 - \frac{1}{2}x^2 = C$$

Lesson 29

Section 8.4

$$22. y = \sqrt{13e^{2t} - 4}$$

$$28. y = -\ln\left(\frac{3e^2 - e^{2t}}{2}\right)$$

38. (a) left to the student
(b) $+\infty$
(c) left to the student

Lesson 30

Section 8.5

2. (a) $y(2) \approx 0.429$
(c) $y = 4e^{-x}$

Lesson 31

Section 6.1

$$6. \begin{bmatrix} 12 & -3 \\ 21 & -27 \end{bmatrix}$$

$$14. \begin{bmatrix} 27 \\ -62 \end{bmatrix}$$

$$24. \begin{bmatrix} 8 & 28 & 14 \\ 3 & 27 & -25 \\ -26 & 14 & -20 \end{bmatrix}$$

Lesson 32

Section 6.1

$$32. (a) \begin{bmatrix} 0.5 & 1.25 \\ 0.75 & 0.25 \end{bmatrix}$$

$$(b) \begin{bmatrix} 110 \\ 87 \end{bmatrix}$$

$$(c) \begin{bmatrix} 164 \\ 102 \end{bmatrix}$$

Lesson 33

Section 6.2

$$2. x = 10, y = 5$$

$$6. (a, 4a - 2)$$

$$18. x = 46, y = 18, z = -32$$

$$34. \left(\frac{-8z+11}{5}, \frac{7z+1}{5}, z\right)$$

Lesson 34

Section 6.2

$$26. x = 16, y = 20, z = -6$$

$$28. x = 1, y = 5, z = 5$$

42. approximately 113 hatchlings, 42 adults

Lesson 37

Section 6.3

$$6. \begin{bmatrix} 7/18 & -1/18 \\ 2/9 & 1/9 \end{bmatrix}$$

Answers to Even-Numbered Homework Problems

10. $\begin{bmatrix} -2 & 2 & 1 \\ 1 & 2 & 0 \\ 0 & -1 & 0 \end{bmatrix}$

14. $\begin{bmatrix} -61 & -75 & -81 \\ 21 & 26 & 28 \\ 31 & 38 & 41 \end{bmatrix}$

Lesson 41

Section 6.5

8. $x_n = c_1 3^n + c_2 5^n$.

16. $x_n = \frac{11}{4}(-1)^n + \frac{17}{4}2^n$.

38. $x_n = -46.105(-0.137)^n + 46.105(0.947)^n$.

Lesson 38

Section 6.3

26. 4, invertible.

30. 0, not invertible.

34. -77 , invertible.

Lesson 39

Section 6.4

2. Eigenvector, with eigenvalue 3.

6. Eigenvector, with eigenvalue 10.

12. Not an eigenvector.

16. $v = 5w - 2u$.

Lesson 40

Section 6.4

22. Eigenvalue $r = -1$, eigenvector $\begin{bmatrix} -4t \\ 3t \end{bmatrix}$,
 $t \neq 0$

Eigenvalue $r = 4$, eigenvector $\begin{bmatrix} t \\ -t \end{bmatrix}$, $t \neq 0$.

40. $\begin{bmatrix} -81 \\ 81 \end{bmatrix}$.