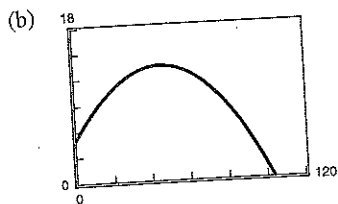


Section 8.2 (page 577)

82. (a) $y = -0.004x^2 + 0.367x + 5$



13 feet, 104 feet

(c) 13.418 feet, 103.793 feet

84. (a) $x_1 = 500 - s - t$, $x_2 = -200 + s + t$, $x_3 = s$,
 $x_4 = 350 - t$, $x_5 = t$

(b) $x_1 = 100$, $x_2 = 200$, $x_3 = 50$, $x_4 = 0$, $x_5 = 350$

(c) $x_1 = 150$, $x_2 = 150$, $x_3 = 0$, $x_4 = 0$, $x_5 = 350$

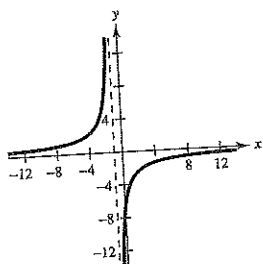
86. False. It is a 2×4 matrix.

88. False. Gauss-Jordan elimination reduces a matrix until a reduced row-echelon form is obtained.

90. $\begin{bmatrix} 1 & 3 & 1 & 3 \\ 0 & 1 & 2 & -1 \\ 0 & 0 & 1 & 2 \end{bmatrix}$, $\begin{bmatrix} 1 & 3 & 1 & 3 \\ 0 & 1 & 2 & -1 \\ 0 & 0 & 1 & 2 \end{bmatrix}$

(Answers will vary.)

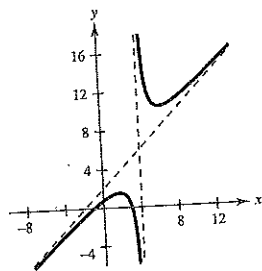
92.



Asymptotes:

$x = -1$, $y = 0$

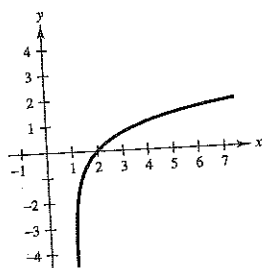
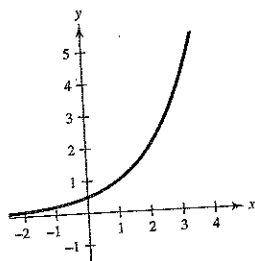
94.



Asymptotes:

$x = 4$, $y = x + 2$

98.



100. $(2, -1)$

102. $(-1, 2, -2)$

2. $x = 13$, $y = 12$

4. $x = -5$, $y = -4$, $z = 9$

6. (a) $\begin{bmatrix} -2 & 0 \\ 6 & 3 \end{bmatrix}$

(b) $\begin{bmatrix} 4 & 4 \\ -2 & -1 \end{bmatrix}$

(c) $\begin{bmatrix} 3 & 6 \\ 6 & 3 \end{bmatrix}$

(d) $\begin{bmatrix} 9 & 10 \\ -2 & -1 \end{bmatrix}$

8. (a) $\begin{bmatrix} 8 & -2 & 3 \\ -5 & 0 & 3 \end{bmatrix}$

(b) $\begin{bmatrix} -4 & 4 & -1 \\ 3 & -2 & 7 \end{bmatrix}$

(c) $\begin{bmatrix} 6 & 3 & 3 \\ -3 & -3 & 15 \end{bmatrix}$

(d) $\begin{bmatrix} -6 & 9 & -1 \\ 5 & -5 & 19 \end{bmatrix}$

10. (a) $\begin{bmatrix} -4 & 9 & 1 \\ 5 & -6 & -5 \\ 15 & -5 & -2 \\ 3 & 10 & -10 \\ -4 & 0 & -2 \end{bmatrix}$

(b) $\begin{bmatrix} 2 & -1 & -1 \\ 1 & 2 & 9 \\ -5 & 13 & 0 \\ -3 & 6 & -2 \\ -4 & -2 & 2 \end{bmatrix}$

(c) $\begin{bmatrix} -3 & 12 & 0 \\ 9 & -6 & 6 \\ 15 & 12 & -3 \\ 0 & 24 & -18 \\ -12 & -3 & 0 \end{bmatrix}$

(d) $\begin{bmatrix} 3 & 2 & -2 \\ 5 & 2 & 20 \\ -5 & 30 & -1 \\ -6 & 20 & -10 \\ -12 & -5 & 4 \end{bmatrix}$

12. (a) Not possible (b) Not possible

(c) $\begin{bmatrix} 9 \\ 6 \\ -3 \end{bmatrix}$

(d) Not possible

14. $\begin{bmatrix} -7 & 7 \\ 1 & -2 \\ 4 & -5 \\ -5 & 17 \end{bmatrix}$

16. $[9.5 \quad 2 \quad -7 \quad 4.5]$

18. $\begin{bmatrix} -\frac{11}{3} & -\frac{31}{3} \\ 1 & \frac{3}{2} \\ -8 & -1 \end{bmatrix}$

20. $\begin{bmatrix} -440 & 495 \\ -495 & 1375 \end{bmatrix}$

22. $\begin{bmatrix} 132 & 168 \\ -108 & 60 \\ -348 & -180 \end{bmatrix}$

24. $\begin{bmatrix} -2 & -2.5 \\ 0 & 0 \\ 5 & -3.5 \end{bmatrix}$

26. $\begin{bmatrix} 2 & -5 \\ -5 & 0 \\ 5 & 6 \end{bmatrix}$

28. (a) $\begin{bmatrix} -7 & 3 \\ -14 & 12 \end{bmatrix}$

(b) $\begin{bmatrix} -4 & 2 \\ 3 & 9 \end{bmatrix}$

(c) $\begin{bmatrix} 3 & 2 \\ -2 & 15 \end{bmatrix}$

30. (a) $\begin{bmatrix} 4 & 2 \\ -2 & 4 \end{bmatrix}$

(b) $\begin{bmatrix} 4 & 2 \\ -2 & 4 \end{bmatrix}$

(c) $\begin{bmatrix} 0 & -2 \\ 2 & 0 \end{bmatrix}$

32. (a) $[12]$

(b) $\begin{bmatrix} 6 & 4 & 2 \\ 9 & 6 & 3 \\ 0 & 0 & 0 \end{bmatrix}$

(c) Not possible

34. $\begin{bmatrix} -2 & 17 \\ 15 & 12 \\ 18 & 46 \end{bmatrix}$ 36. $\begin{bmatrix} 3 & 0 & 0 \\ 0 & -4 & 0 \\ 0 & 0 & -10 \end{bmatrix}$

38. $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ 40. Not possible

42. $\begin{bmatrix} 252 & 30 \\ 298 & 452 \\ 217 & 180 \end{bmatrix}$ 44. Not possible

46. $\begin{bmatrix} -238 & 50 & -484 \\ 119 & 115 & 342 \\ 210 & 135 & 555 \end{bmatrix}$ 48. $\begin{bmatrix} 27 & -6 \\ -6 & -27 \end{bmatrix}$

50. $\begin{bmatrix} 12 & 6 \\ -4 & -2 \\ 20 & -10 \\ 28 & 14 \end{bmatrix}$

52. (a) 54. (a) 56. (d)

58. (a) $\begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 5 \\ 10 \end{bmatrix}$ (b) $\begin{bmatrix} -2 \\ 3 \end{bmatrix}$

60. (a) $\begin{bmatrix} -4 & 9 \\ 1 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -13 \\ 12 \end{bmatrix}$ (b) $\begin{bmatrix} -23 \\ -\frac{35}{3} \end{bmatrix}$

62. (a) $\begin{bmatrix} 1 & 1 & -3 \\ -1 & 2 & 0 \\ 0 & -1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}$

(b) $\begin{bmatrix} 2a - 1 \\ a \\ a \end{bmatrix}$

64. (a) $\begin{bmatrix} 1 & -1 & 4 \\ 1 & 3 & 0 \\ 0 & -6 & 5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 17 \\ -11 \\ 40 \end{bmatrix}$

(b) $\begin{bmatrix} 4 \\ -5 \\ 2 \end{bmatrix}$

66. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ 68. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ 70. Not possible

72. 2×2 74. Not possible 76. 2×2 78. 2×3

80. $\begin{bmatrix} 110 & 99 & 77 & 33 \\ 44 & 22 & 66 & 66 \end{bmatrix}$

82. [\$497,500 \$494,500]

The entries represent the costs of the three models of the product at each of the two warehouses.

84. $\begin{bmatrix} \$17.70 & \$15.00 \\ \$29.40 & \$25.00 \\ \$50.40 & \$43.00 \end{bmatrix}$

The entries are labor costs at each plant for each size of boat.

86. $P^3 = \begin{bmatrix} 0.300 & 0.175 & 0.175 \\ 0.308 & 0.433 & 0.217 \\ 0.392 & 0.392 & 0.608 \end{bmatrix}$

$P^4 = \begin{bmatrix} 0.250 & 0.188 & 0.188 \\ 0.315 & 0.377 & 0.248 \\ 0.435 & 0.435 & 0.565 \end{bmatrix}$

$P^5 = \begin{bmatrix} 0.225 & 0.194 & 0.194 \\ 0.314 & 0.345 & 0.267 \\ 0.461 & 0.461 & 0.539 \end{bmatrix}$

$P^6 = \begin{bmatrix} 0.213 & 0.197 & 0.197 \\ 0.311 & 0.326 & 0.280 \\ 0.477 & 0.477 & 0.523 \end{bmatrix}$

$P^7 = \begin{bmatrix} 0.206 & 0.198 & 0.198 \\ 0.308 & 0.316 & 0.288 \\ 0.486 & 0.486 & 0.514 \end{bmatrix}$

$P^8 = \begin{bmatrix} 0.203 & 0.199 & 0.199 \\ 0.305 & 0.309 & 0.292 \\ 0.492 & 0.492 & 0.508 \end{bmatrix}$

Approaches the matrix $\begin{bmatrix} 0.2 & 0.2 & 0.2 \\ 0.3 & 0.3 & 0.3 \\ 0.5 & 0.5 & 0.5 \end{bmatrix}$.

88. False. Matrix multiplication is not commutative.

90. $AC = BC = \begin{bmatrix} 2 & 3 \\ 2 & 3 \end{bmatrix}$

92. $A^2 = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$, $A^3 = \begin{bmatrix} -i & 0 \\ 0 & -i \end{bmatrix}$, $A^4 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

94. The product is a diagonal matrix whose entries are the products of the corresponding entries of A and B.

96. $\frac{4}{3}, -8$ 98. $\frac{-5 + \sqrt{37}}{4}, \frac{-5 - \sqrt{37}}{4}$

100. $4, \pm \sqrt{\frac{5}{3}}i$ 102. $\ln 100 - 2$

104. $2 \ln x + 3 \ln(x - 2)$ 106. $\ln\left(\frac{64}{3\sqrt{x^2 + 3}}\right)$

108. $\ln\left(\frac{\sqrt{x}(x + 5)}{\sqrt{x - 8}}\right)$ 110. $(0, 5, -1)$

Section 8.3 (page 588)

2.-12. Answers will vary. 14. $\begin{bmatrix} 7 & -2 \\ -3 & 1 \end{bmatrix}$

16. $\begin{bmatrix} -19 & -33 \\ -4 & -7 \end{bmatrix}$ 18. Does not exist

20. Does not exist 22. $\begin{bmatrix} -13 & 6 & 4 \\ 12 & -5 & -3 \\ -5 & 2 & 1 \end{bmatrix}$

24. Does not exist

26. $\frac{1}{R}$

30. $\frac{1}{2}$

34. $\frac{1}{4}$

36. $\frac{1}{9}$

40. $\frac{1}{9}$

44. 6

50. -

56. -

62. $\frac{1}{9}$

66. \$0

\$3

68. \$2

\$2

70. I_1

72. Fa

74. An

76. (a)

(b)

78. -1

82. $\begin{bmatrix} x \\ f \end{bmatrix}$

-3