

Student Homework and Review Problem Answer Supplement

By Roberta Bloom

to accompany

Applied Finite Mathematics 3rd ed, 2016

by Rupinder Sekhon & Roberta Bloom

De Anza College

Cupertino CA

This answer supplement contains answers to

- most odd numbered homework problems (with a few exceptions that are not included)
- few selected even numbered homework problems in some sections of the textbook
- all end of chapter review problems for all chapters of the textbook

This supplement does not contain complete worked out solutions.

If you find any errors that need to be corrected, please send that information, or any other correspondence, to Roberta Bloom at bloomroberta@deanza.edu or bloomroberta@fhda.edu

Applied Finite Mathematics, 3rd edition, 2016

By Rupinder Sekhon 1995, 1996

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Chapter 1 Linear Models

Answers to Odd Numbered Homework Problems at end of sections

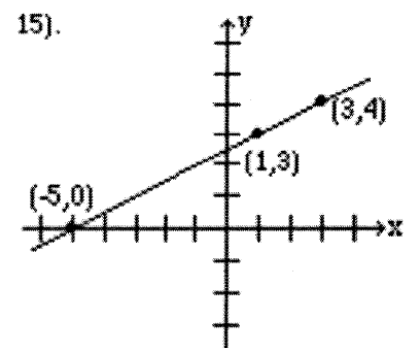
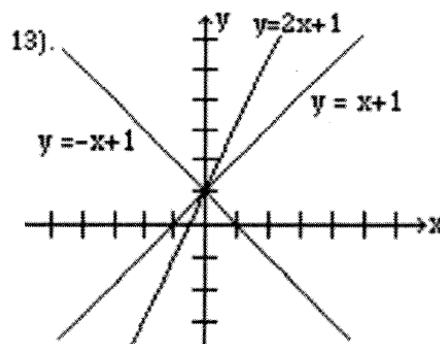
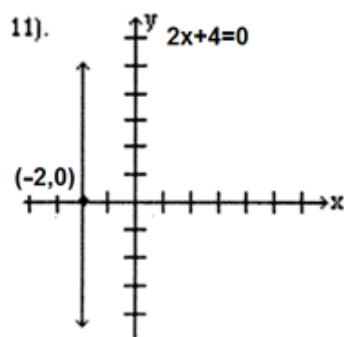
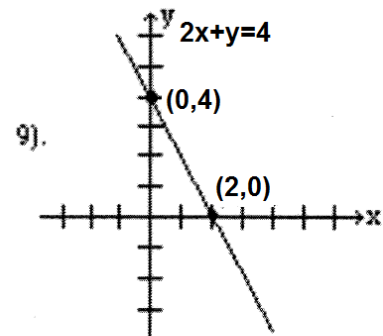
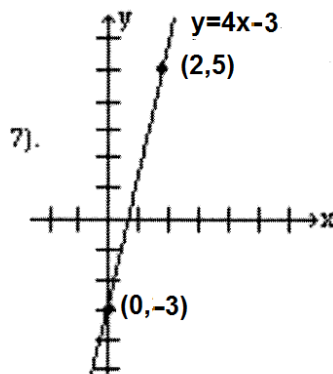
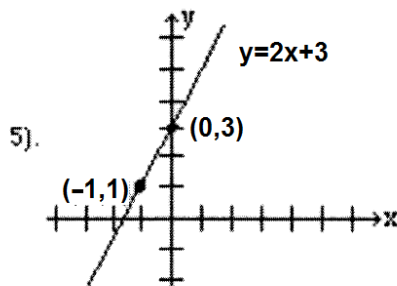
and

Answers to all problems in Chapter Review Section

1.1 Graphing a Linear Equation

1). Yes

3). $(2, -6), (6, 6), (0, -12), (4, 0)$



1.2 Slope of a Line

1). $m = 2$

3). $m = 1$

5). $m = -2$

7). $m = \text{undefined}$

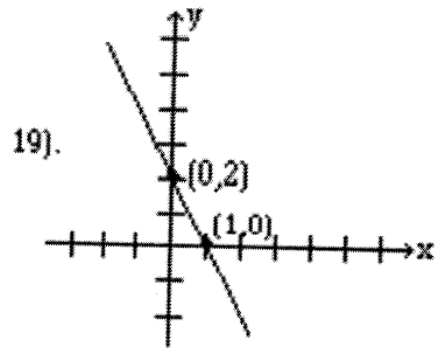
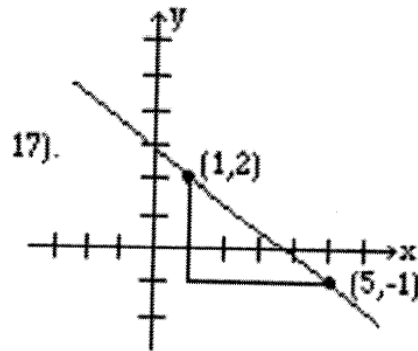
9). $m = -1$

11). $m = -2$

13). $m = 2$

15). $m = 3/4$

1.2 Slope of a Line



1.3 Determining the Equation of a Line

1). $y = 2x + 4$

3). $y = 6x - 13$

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

7). $y = 7x - 32$

9). $y = \frac{5}{2}x - 10$

11). $y = -4$

13). $x = 3$

15). $2x - y = 7$

17). $3x - 4y = -4$

19). $4x - 3y = 17$

21) $y + 3 = \frac{4}{3}(x - 2)$ OR $y - 1 = \frac{4}{3}(x - 5)$

23) $y + 2 = -\frac{2}{3}(x - 6)$ OR $y - 2 = -\frac{2}{3}(x - 0)$

25) $y - 7 = -\frac{1}{3}(x + 12)$

1.4 Applications

1). $y = 25x + 1200$

3). $y = 20x + 350$

5). $y = 80x + 24000$

7). $y = \frac{2}{5}x$; 68

9). $y = 7x - 338$; 138

11). $F = \frac{9}{5}C + 32$; 77°F

13) $y = .375x + 29.8$; 42.925 million people in 2025

15) $y = 120x + 13200$; 14400 students in 2010

17) $y = .18x + 10$; The cost is \$82 for a home using 400 kwh of electricity per month

19) a) $y = 12x + 110,000$ b) $y = \$230,000$ c) $x = \$7500$

21 a) $y = 3x + 1000$ b) when \$100 is spent on ads, 1300 cups of coffee are sold.

1.5 More Applications

- 1) $x=3, y=13$
- 3) $x=\$11.50$ $y=16500$ items
- 5) ^{a)} Plan I costs \$87; Plan II costs \$99; Plan I is better
b) $x=150$ miles; both plans cost \$61.50
- 7) Supply Curve: $y=400x-1200$
- 9) $x=4000$ cookies; cost = revenue = \$3200
- 11) $x=8000$ pairs of socks; cost = revenue = \$36000
- 13) a) cost function $y=10x+700$
b) fixed cost = \$700
c) $x=140$ pounds d) revenue = cost = \$2100

1.6 Review Problems

- | | | |
|--|---|-----------------|
| 1). $y=0$ | 2). $-2/3$ | 3). -3 |
| 4). $4, -6$ | 5). $y=3x+5$ | 6). $3x+2y=6$ |
| 7). $y=3x+9$ | 8). $3x+2y=18$ | 9). $y=9/5x+32$ |
| 10). $y=3x-1$ | 11). $(3, -1)$ | 12). No |
| 13). $(2,1), (5,-1)$; Answers will vary | 14). $(3,0), (3,1)$; Answers will vary | |
| 15). The line through $(-3,0)$ & $(0,2)$ | 16). The line through $(0,3)$ & $(1,1)$ | |
| 17). $y=4x-140$; 140 | 18). $y=1.35x+15.2$; 142.5 | |
| 19). $y=30x+2750$ | 20). $y=10x+1500$; 4500 | |
| 21). $y=15x+1200$; 16200 | 22). $y=10000x+280000$; 580000 | |
- 22) $y=5000x-9670000$ if using x = calendar year
 $y=5000x+280000$ if using x = years since 1990
In 2020, price of house is \$430,000

1.6 Review Problems

23) $y = 1.5x + 95.4$ if using $x = \#$ of years after 1995
 $y = 1.5x - 2897.1$ if using $x =$ calendar year

24) a) $y = -2x + 230$ b) 80 bowls of soup c) 65°F

25) $y = -50x + 450$ 26) $y = 80x - 400$

27) Price = \$6 ; number of mugs = 1300

28) Plan I: $y = 16 + .25x$ Plan II $y = 45$

At $x = 200$ miles Plan I costs \$66; Plan II costs \$45

Both cost the same at $x = 116$ miles

29) a) 4500 b) \$20 c) \$15 d) 2750 items

30) \$12; 6900 items 31) \$1700 sales

32) 600 items; revenue = cost = \$15000

33) 4000 CFL bulbs

34) 2500 items

35) 12500 shavers

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Chapter 2 Matrices

Answers to Odd Numbered Homework Problems at end of sections
and

Answers to all problems in Chapter Review Section

2.1 Introduction to Matrices

$$1) \begin{bmatrix} 18 & 15 \\ 14 & 13 \\ 12 & 9 \end{bmatrix} \quad 3) \begin{bmatrix} 84 \\ 68 \\ 54 \end{bmatrix} \quad 5) [112.2]$$

$$7) AB = \begin{bmatrix} 12 & 22 & 19 \\ 10 & 7 & 5 \\ 9 & 15 & 13 \end{bmatrix} \quad 9) AB + BA = \begin{bmatrix} 19 & 35 & 19 \\ 17 & 25 & 20 \\ 20 & 38 & 20 \end{bmatrix}$$

$$11) 2BC = \begin{bmatrix} 10 \\ 30 \\ 16 \end{bmatrix} \quad 13) A^2B = \begin{bmatrix} 105 & 123 & 100 \\ 37 & 52 & 44 \\ 73 & 87 & 71 \end{bmatrix}$$

$$15) FE = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} m & n \\ p & q \end{bmatrix} = \begin{bmatrix} am+bp & an+bq \\ cm+dp & cn+dq \end{bmatrix}$$

17) H is a 3×1 matrix. G is a 3×3 matrix.

HG does not exist because the number of columns in H does not equal the number of rows in G.

$$19) \begin{bmatrix} 1 & -2 & 2 \\ 1 & -3 & 4 \\ 1 & -2 & -3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 7 \\ -12 \end{bmatrix}$$

$$21) \begin{bmatrix} 1 & 2 & 3 & 2 \\ 1 & -2 & -1 & 0 \\ 0 & 1 & -2 & 4 \\ 1 & 0 & 3 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix} = \begin{bmatrix} 14 \\ -5 \\ 9 \\ 15 \end{bmatrix} \quad \text{OR} \quad \begin{bmatrix} 2 & 1 & 2 & 3 \\ 0 & 1 & -2 & -1 \\ 4 & 0 & 1 & -2 \\ 3 & 1 & 0 & 3 \end{bmatrix} \begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 14 \\ -5 \\ 9 \\ 15 \end{bmatrix}$$

2.2 System of Linear Equations; Gauss-Jordan Method

- 1). $(4, -1)$
- 3). $(2, -1, 3)$
- 5). $(0.4, 0.3)$
- 7). $(4, 3, 2, 1)$

2.3 System of Linear Equations; Gauss – Special Cases

- 1). $(4 - 3t, t)$
- 3). Inconsistent system, no solution
- 5). $(3 - 4/7 t, -1 + 16/7 t, t)$
- 7). No, they are not consistent.
- 9). $(5, 3, 1), (4, 3, 2), (3, 3, 3)$
- 11). $(5 - 3s + t, s, t)$

2.4 Inverse Matrices

- 3). $\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$
- 5). $\begin{bmatrix} 1 & 2 & -1 \\ -1 & -3 & 2 \\ -1 & -1 & 1 \end{bmatrix}$
- 7). $(4, 2)$
- 9). $(3, 3, 4)$

- 11). If a matrix M has an inverse, then the system of linear equations that has M as its coefficient matrix has a unique solution. If a system of linear equations has a unique solution, then the number of equations must be the same as the number of variables. Therefore, the matrix that represent its coefficient matrix must be a square matrix.

2.5 Application of Matrices in Cryptography

- 1). $\begin{bmatrix} 71 \\ 24 \end{bmatrix} \begin{bmatrix} 66 \\ 23 \end{bmatrix} \begin{bmatrix} 78 \\ 35 \end{bmatrix} \begin{bmatrix} 87 \\ 36 \end{bmatrix} \begin{bmatrix} 114 \\ 47 \end{bmatrix}$
- 3). RETURN HOME
- 5). $\begin{bmatrix} 12 \\ 51 \\ 9 \end{bmatrix} \begin{bmatrix} 11 \\ 67 \\ 2 \end{bmatrix} \begin{bmatrix} 19 \\ 95 \\ 14 \end{bmatrix} \begin{bmatrix} 14 \\ 105 \\ -11 \end{bmatrix} \begin{bmatrix} 15 \\ 87 \\ -3 \end{bmatrix} \begin{bmatrix} 27 \\ 91 \\ 18 \end{bmatrix} \begin{bmatrix} 4 \\ 67 \\ -23 \end{bmatrix}$
- 7). HEAD FOR THE HILLS

2.6 Applications – Leontief Models

- 1). $(t, -2t, t)$ 3). Chris = \$1250, Ed = \$1,000
- 5). $\begin{bmatrix} 315.34 \\ 383.52 \\ 440.34 \end{bmatrix}$
- 7). Farming = \$201,754.38, Building = \$307,017.54
- 9). $\begin{bmatrix} 30/100 & 10/120 & 20/110 \\ 20/100 & 30/120 & 20/110 \\ 10/100 & 10/120 & 30/110 \end{bmatrix}$

2.7 Chapter Review

- 1). a. $\begin{bmatrix} 1000 & 400 & 15 \\ 800 & 500 & 20 \end{bmatrix}$ b. $\begin{bmatrix} 30 & 50 \end{bmatrix}$
- 2). a. $\begin{bmatrix} 2 & 1 & 1 \\ 2 & 1 & -1 \end{bmatrix}$ b. $\begin{bmatrix} -3 & -9 & 11 \\ 7 & -14 & 9 \end{bmatrix}$
- 3). a. $\begin{bmatrix} -2 & 8 & 0 \\ -2 & 4 & 6 \\ -4 & 6 & 6 \end{bmatrix}$ b. $\begin{bmatrix} -5 & 10 & 2 \\ -7 & 4 & 7 \\ -8 & 9 & 7 \end{bmatrix}$
- 4). a. $\begin{bmatrix} 2 & -2 & 4 \\ 14 & 16 & -22 \\ 8 & 10 & -14 \end{bmatrix}$ b. $\begin{bmatrix} 9 & -3 \\ 6 & -3 \end{bmatrix}$
- 5). a. $\begin{bmatrix} 2a-2c+6e & 2b-2d+6f \\ 6a+4c+2e & 6b+4d+2f \end{bmatrix}$ b. $\begin{bmatrix} a+3b & -a+2b & 3a+b \\ c+3d & -c+2d & 3c+d \\ e+3f & -e+2f & 3e+f \end{bmatrix}$
- 6). a. $(2, 1, -1)$ b. $(3, 2, 1)$
- 7). Apple = \$.50; banana = \$.30; orange = \$.40
- 8). a. $x = 6 - t, y = 0, z = t; (5, 0, 1)$ b. no solution

9). $n = 3t - 12$, $d = -4t + 24$, $q = t$; $n = 3$, $d = 4$, $q = 5$

10). a. $x = 4 - 2t$, $y = t$, $z = 3$; $(4, 0, 3)$ b. $x = 5 - 4t$, $y = 2 - t$, $z = t$; $(1, 1, 1)$

11). a. $x = .5t$, $y = t$, $z = 2t$; $(1, 2, 2)$ b. no solution

12). a. $\begin{bmatrix} 5 & -3 \\ -3 & 2 \end{bmatrix}$ b. $\begin{bmatrix} 1 & -2 & 1 \\ -1 & 1 & 0 \\ 1 & 1 & -1 \end{bmatrix}$

13). a. $(-1, 4, 2)$ b. $(6, 4, 2, -1)$

14). a. $\begin{bmatrix} 22 \\ 33 \\ 1 \end{bmatrix} \begin{bmatrix} 59 \\ 68 \\ 27 \end{bmatrix} \begin{bmatrix} 74 \\ 75 \\ 27 \end{bmatrix} \begin{bmatrix} 22 \\ 49 \\ 4 \end{bmatrix} \begin{bmatrix} 60 \\ 74 \\ 21 \end{bmatrix}$ b. $\begin{bmatrix} 17 \\ 37 \\ 5 \end{bmatrix} \begin{bmatrix} 57 \\ 78 \\ 15 \end{bmatrix} \begin{bmatrix} 74 \\ 91 \\ 27 \end{bmatrix} \begin{bmatrix} 39 \\ 42 \\ 9 \end{bmatrix} \begin{bmatrix} 65 \\ 92 \\ 27 \end{bmatrix}$

15). a. NO PAIN NO GAIN b. GO FOR THE GOLD

16). $x = 40/33$ t, $y = 36/33$ t, $z = t$; Chris = 40 hrs, Bob = 36 hrs, Matt = 33 hrs

17). Chris = 34.1 hrs, Bob = 32.2 hrs, Matt = 35.2 hrs

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Chapter 3: Linear Programming: Geometric approach

Answers to Odd Numbered Homework Problems and

Answers to all Problems in the Chapter Review Section

Answers To Odd-numbered Problems

3.1 Maximization Applications

- 1). 80 acres of wheat and 20 acres of corn should be planted to maximize profit to \$8,400.
- 3). 10 chairs and 15 tables should be manufactured to maximize profit to \$650.
- 5) Maximum value of Z is 40 when $x = 0$ and $y = 4$

3.2 Minimization Applications

- 1). 30 units of Food A and 45 units of Food B should be purchased to keep costs at a minimum of \$105.
- 3). Cost: $C = 12,000x + 10,000y$
 - I. $200x + 100y \geq 800$ high-grade oil
 - II. $300x + 100y \geq 900$ medium-grade oil
 - III. $200x + 200y \geq 1000$ low-grade oilRefinery A should be operated for 3 days, while Refinery B should be operated for 2 days to keep a minimum cost of \$56,000.

3.3 Chapter Review

- 1). (16000, 4000); \$2240
- 2). (2, 3); **\$34,500**
- 3). (8, 20); **\$480**
- 4). (12000, 8000)
- 5). (72, 180); \$5760
- 6). (165, 35); \$21,750
- 7). (20, 60); \$34
- 8). (20, 20); \$2.40
- 9). (6, 18); \$1650
- 10). (35, 100); \$2600
- 11). (40, 20); \$100,000
- 12). (10, 5); 17.5 minutes
- 13). (1000, 800); \$7400

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Chapter 4: Linear Programming by the Simplex Method
Answers to Odd Numbered Homework Problems and
Answers to all problems in the Chapter Review Section

4.1 No homework problems

4.2 Maximization by the Simplex Method

- 1). $x_1 = 0, x_2 = 9, x_3 = 3, z = 27$ 3). Wheat 80 acres, corn 20 acres; Profit \$8400
5). 600 boxes; 400 of Box I, 200 of Box II, and none of Box III

4.3 Minimization by the Simplex Method

- 1) Dual program is Maximize $z = 7y_1 + 9y_2$
Subject to $2y_1 + 4y_2 \leq 6, 3y_1 + 5y_2 \leq 8, y_1 \geq 0, y_2 \geq 0$
Answer to minimization problem is $x_1 = 0, x_2 = 7/3, z = 56/3$
3) Dual program is Maximize $z = 10y_1 + 24y_2$
Subject to $1y_1 + 3y_2 \leq 4, 1y_1 + 2y_2 \leq 3, y_1 \geq 0, y_2 \geq 0$
Answer to minimization problem is $x_1 = 4, x_2 = 6, z = 34$

4.4 Review Problems

- 1). $x_1 = 4, x_2 = 8, y_1 = 0, y_2 = 0, z = 44$
2). $x_1 = 6, x_2 = 12, y_1 = 0, y_2 = 0, z = 126$
3). $x_1 = 6, x_2 = 4, x_3 = 0, y_1 = 0, y_2 = 0, z = 24$
4). $x_1 = 450, x_2 = 0, x_3 = 1800, y_1 = 750, y_2 = 0, y_3 = 0, z = 14,850$
5). $x_1 = 0, x_2 = 200, x_3 = 1600, y_1 = 0, y_2 = 0, y_3 = 1200, z = 9600$
6). $x_1 = 2, x_2 = 4, z = 64$
7). $x_1 = 10, x_2 = 10, x_3 = 0, z = 100$
8). $x_1 = 15.4, x_2 = 35.4, x_3 = 0, z = 570$
9). $x_1 = 0, x_2 = 80, x_3 = 100, y_1 = 0, y_2 = 20, y_3 = 0, z = 23000$
10). $x_1 = 0, x_2 = 30, x_3 = 60, y_1 = 0, y_2 = 0, z = 3300$
11). $x_1 = 60, x_2 = 20, z = 340,000$
12). $x_1 = 12, x_2 = 0, x_3 = 10, z = 42$

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Chapter 5 Exponential and Logarithmic Functions

Sections 5.1, 5.2, 5.3, 5.5 Answers to Odd Numbered Homework Questions

Section 5.4 Answers to Homework Questions #6-11

Section 5.6 Chapter Review Questions Answers to all Questions

5.1 Exponential Growth and Decay Models

1) exponential 3) linear 5) linear 7) power

9) decay 11) growth

13) $y = 127(.7047)^t$ $r = -.2953$ 29.53% annual decay rate

15) $y = 17250(1.2712)^t$ $r = .2712$ 27.12% annual growth rate

17) $y = 350000 + 7000t$ At $t = 5$ $y = \$385000$

19) $y = 50000(.94)^t$ At $t = 10$ $y = \$26930.76$

21) $y = 200 + 10t$ At $t = 7$ $y = 270$

23) $y = 300(.93)^t$ At $t = 6$ $y = 194$

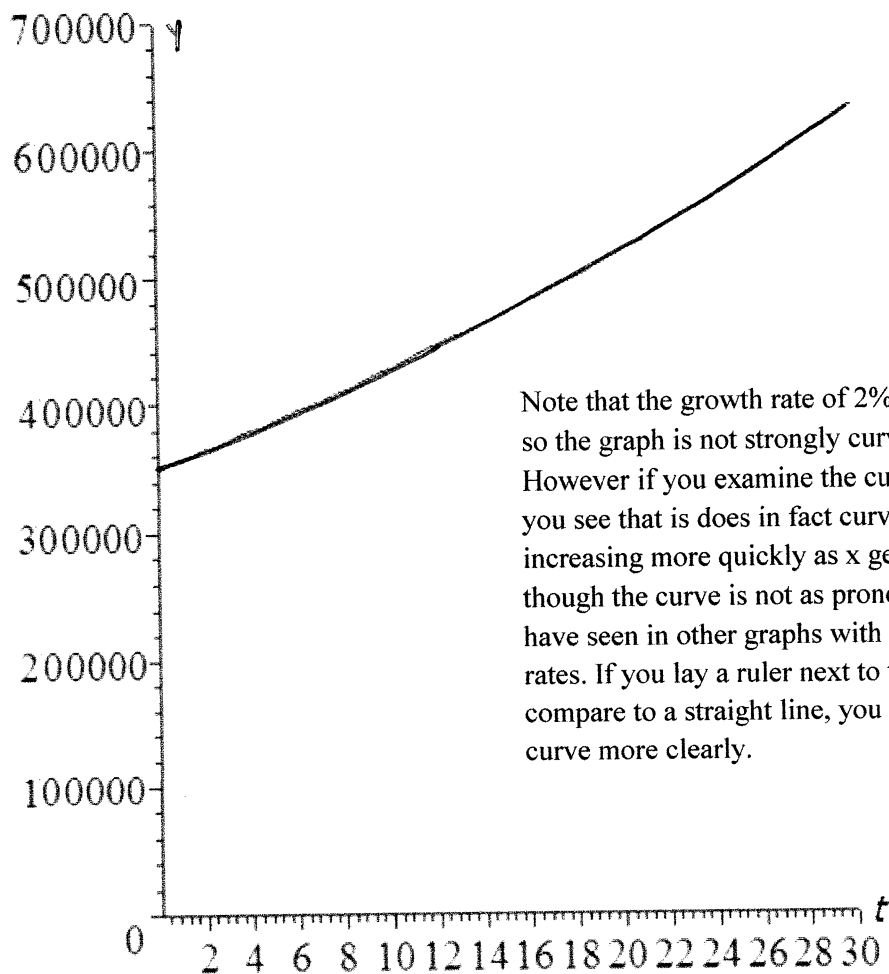
25) $y = 400e^{-.26t}$ At $t = 7$ $y = 2469$

27) $y = 4000e^{-.12t}$ At $t = 10$ $y = 1205$

5.2 Graphs and Properties of Exponential Growth and Decay Models

5.2#1: $y=ab^t=350000(1.02)^t$ where t is number of years since 2010

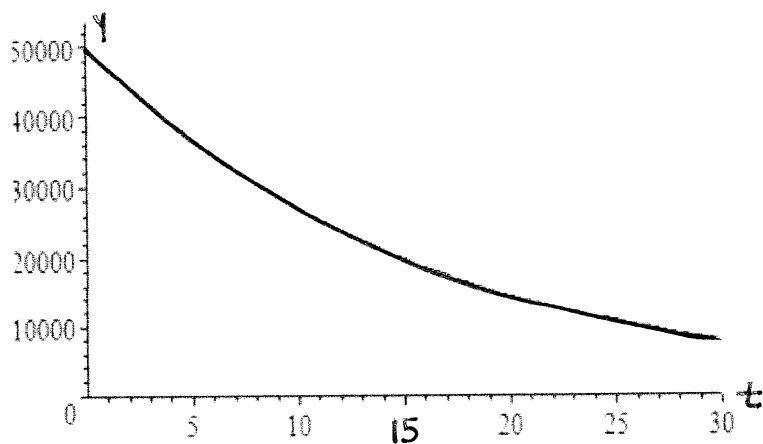
y intercept is the point $(0, 350000)$



5.2#3:

$$y=ab^t=50000(0.94)^t$$

y intercept is the point $(0, 50000)$

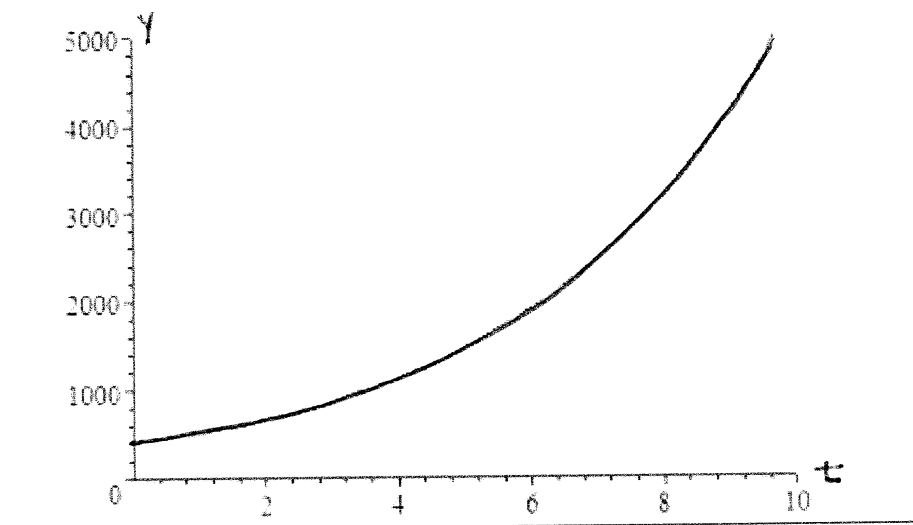


5.2 Graphs and Properties of Exponential Growth and Decay Models

5.2 #5:

$$y = ae^{kt} = 400e^{0.26t}$$

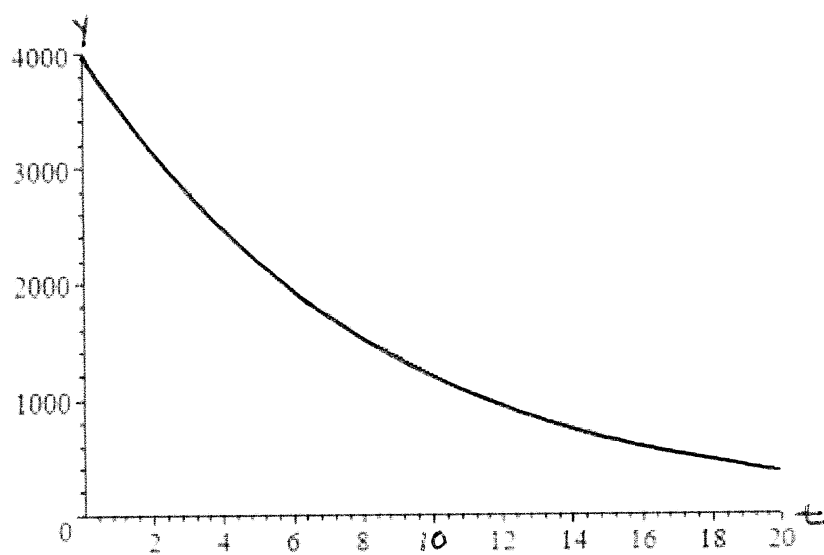
y intercept is (0, 400)



5.2#7

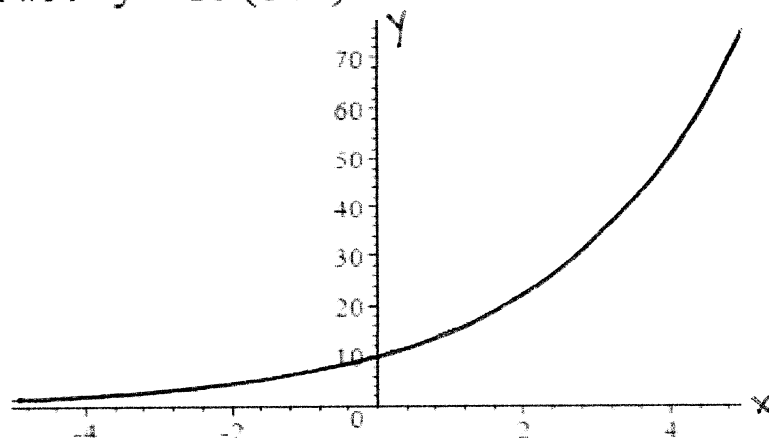
$$y = ae^{kt} = 400e^{-0.12t}$$

y intercept is (0, 4000)



5.2 Graphs and Properties of Exponential Growth and Decay Models

5.2 #9: $y = 10(1.5^x)$



b. y intercept is (0, 10)

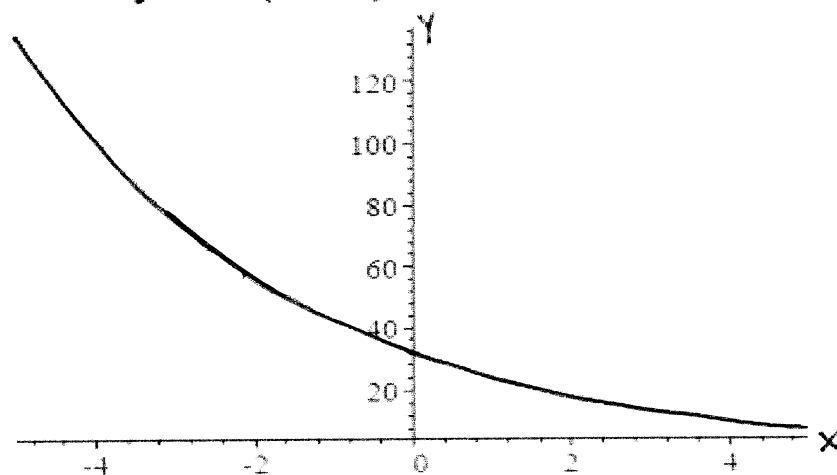
c. Horizontal asymptote is the x axis
which is the line $y = 0$.

The function approaches the asymptote as $x \rightarrow -\infty$

d. Domain – all real numbers

Range – all positive real numbers

5.2 #11: $y = 32(0.75^x)$



b. y intercept is (0, 32)

c. Horizontal asymptote is the x axis
which is the line $y = 0$.

The function approaches the asymptote as $x \rightarrow \infty$

d. Domain – all real numbers

Range – all positive real numbers

5.3 Logarithms and Logarithmic Functions

$$1) \log_3 81 = 4 \quad 3) \log_5 .04 = -2$$

$$7) \log_{16} 2 = \frac{1}{4} \quad 9) 5^4 = 625 \quad 9) 11^3 = 1331$$

$$11) 64^{1/3} = 4 \quad 13) \log_5 15625 = x \quad 15) 5^x = 125$$

$$17) 10^4 = y \quad 19) x = e^{-1} \text{ or } x = \frac{1}{e} \text{ (equivalent answers)}$$

$$21) x = 5^3 \text{ so } x = 125 \quad 23) x = 10^{-3} \text{ so } x = \frac{1}{1000} = .001$$

$$25) x = 25^{1/2} \text{ so } x = \sqrt{25} = 5$$

$$27) 1/3 \quad 29) 10 \quad 31) 1.30103 \quad 33) 1.06471$$

$$35) 2.58496 \quad 37) 25.676548$$

5.4 Graphs and Properties of Logarithmic Functions

Answers to matching graphs questions #6-11

$$6) y = 3e^{-.6x} \quad 7) y = \log_2 x \quad 8) y = 3(2^x)$$

$$9) y = \log_{1/2} x \quad 10) y = 5e^{.3x} \quad 11) y = 5(.4^x)$$

5.5 Applications of Exponential and Logarithmic Functions

$$① a) y = 20000(1.05^t) \quad b) \text{ At } t = 12, y = \$35917.13$$

$$c) y = 30000 \text{ at } t = 8.31 \text{ years}$$

$$② a = \$55974.13$$

$$⑤ y = 5000 \text{ at } t = 13.8 \text{ months}$$

$$⑦ y = 100000 \text{ at } t = 9.35 \text{ years}$$

$$⑨ r = .0227 \quad 2.27\% \text{ annual growth rate}$$

$$⑪ r = -.0543 \quad 5.43\% \text{ annual decay rate}$$

$$⑬ a) y = 7900(1.603)^t$$

$$b) y = 4567 e^{-.4005t}$$

$$c) y = 18720 e^{.38526t}$$

$$d) y = 1200(.925)^t$$

5.6 Chapter Review

- ① a) $a = \$45503$ b) $t = 9.6$ years c) $\$35202$
- ② a) $y = 40000(.973)^t$ b) $\$30422$ c) $t = 25.32$ years
- ③ a) $y = 25000(1.064)^t$ b) $\$86451.51$
- ④ a) $a = 146512$ b) $t = 16.96$ years c) 188500
- ⑤ a) 2998 b) $t = 7.2$ years
- ⑥ a) $r = -.2323$ Hourly decay rate is 23.23%
b) $t = 3.31$ hours c) 36.2 mg
- ⑦ $r = .165$ Annual growth rate is 16.5%
- ⑧ a) $y = 375000e^{.11778t}$
b) $y = 5400(1.13542)^t$
c) $y = 230(.53794)^t$
d) $y = 3600e^{-.8675t}$

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Chapter 6 Financial Calculations
Answers to Odd Numbered Homework Problems
and all Chapter Review Problems

6.1 Simple Interest and Discount

- | | | |
|---------------------------------------|-----------------|------------|
| 1). \$600 | 3). \$3048 | 5). \$1800 |
| 7). \$872 | 9). 11% | |
| 11). Discount \$240, Proceeds \$1,760 | | |
| 13). \$7,440 | 15). \$2,790.70 | |

6.2 Compound Interest

- | | | |
|-----------------------|----------------------------------|----------------------------------|
| 1). \$11,542.52 | 3). \$5,647.77 | |
| 5). Bank B pays more. | Bank A $r_{\text{EFF}} = 0.0513$ | Bank B $r_{\text{EFF}} = 0.0523$ |
| 7). \$12,702.00 | 9). 8.66 years | 11). \$151,257.12 |
| 13). 7.3967% | 15). 17.38 million people | |

6.3 Annuities and Sinking Funds

- | | |
|---|-----------------|
| 1). \$13,954.01 | 3). \$15,904.47 |
| 5). \$20,578.36 | 7). \$6,438.02 |
| 9). A lump sum of \$25,000 is better. $A = \$38002.64$
For \$400 paid monthly $A = \$35872.42$ | |
| 11). \$112,552.26 | |

6.4 Present Value of an Annuity and Installment Payment

- | | | |
|--|-----------------|-----------------|
| 1). \$1,177,953.55 | 3). \$12,043.34 | |
| 5). \$2,149.21 | 7). \$1,976.80 | 11). \$3,645.04 |
| 9). Leasing is better $P = \$37,908$ if payments are assumed made at the end of each year as is the general assumption in this book. | | |

However: if #9 is considered with payments made at the beginning of each year, then the present value is $\$41699 = 37,908(1+0.10)$, which is greater than \$40,000.

In this case, buying would be better assuming payments at the beginning of each year, which more realistically represents the situation in practice in the real world.

6.5 Miscellaneous Application Problems

$$1) m = \$1123.06$$

$$3) P = \$171907.63$$

$$5) P = \$5579.64$$

$$7) P = \$11680.01$$

$$9) m = \$333.85/\text{month} \quad 10) m = \$2177.77/\text{month}$$

$$11) A = \$305421.70$$

$$12) m = \$2479.37$$

$$13) P = P_1 + P_2 = 447.70 + 471.48 = \$919.18$$

$$15) P = P_1 + P_2 = 435.48 + 806.45 = \$1241.94$$

$$17) a) A = \$30535.40 \quad b) m = \$720.63/\text{month}$$

6.6 Classification of Finance Problems

1). D

3). F

5). E

7). D

9a). B 9b). F

11). F

13). A

15). B

17). A

19). B

6.7 Chapter Review

- 1) $\$870 = A$ 2) $81,596$ 3) $\$1190.50 = m$
- 4) $\$1755.93 = m$ 5) $P = \$12156.72$
- 6) $\$160383.25$ 7) $m = \$289.28$
- 8) $P = 16290.63$ loan so value = $\$19290.63$
- 9) $P = \$2085.33$ 10) $P = \$688,675.54$
- 11) $\$497897.83$
- 12) $\$928.94$ if $r = .07$ or $\$1077.95$ if $r = .05$
- 13) $A = \$3447.31$
- 14) a) $m = \$1643.90$ b) $\$128451.61$
- 15) $\$9898.48$
- 16) $PV = P = \$1213539.16$ $FV = A = \$5745936.31$
- 17) $\$6669.70 = m$ 18) $\$767123287.67$
- 19) $m = \$2375.25$ 20) $109,619$
- 21) $\$5805.92 = A$ 22) $P = \$2138.67$
- 23) $\$1523.33$ 24) $\$276.68 = m$
- 25) If leasing $P = \$7835.35$, and the down payment of $\$750$ brings the present value to $\$8585.33$
Purchasing for $\$8000$ is cheaper.
- 26) Cost in 5 years is $\$20615.73$
Sinking fund deposit $m = \$833.79$ / quarter
- 27) Western Bank $r_{EFF} = .0597$ or 5.97%
City Bank is better
- 28) $m = \$404.57$
- 29) $\$300$ per month for 5 years: $P = \$14900.82$
 $\$500$ per month for 3 years: $P = \$16026.59$ is better
- 30) 10.19 years = t
- 31) $\$177692.68 = A$
- 32) $\$20000 + \$500/\text{month}$ for 10 years: $P = \$61210.74$
 $\$12000 + \$1000/\text{month}$ for 5 years: $P = \$61318.43$ better
- 33) $P = \$16384.77$
- 34) Monthly payment $\$2204.21$
Total paid $\$793515.60 = (2204.21)(360)$
Interest $\$368515.6 = 793515.60 - 425000$
- 35) 15.53 years

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Chapter 6 Financial Calculations
Answers to Odd Numbered Homework Problems
and all Chapter Review Problems

6.1 Simple Interest and Discount

- 1). \$600
- 3). \$3048
- 5). \$1800
- 7). \$872
- 9). 11%
- 11). Discount \$240, Proceeds \$1,760
- 13). \$7,440
- 15). \$2,790.70

6.2 Compound Interest

- 1). \$11,542.52
- 3). \$5,647.77
- 5). Bank B pays more. Bank A $r_{\text{EFF}} = 0.0513$ Bank B $r_{\text{EFF}} = 0.0523$
- 7). \$12,702.00
- 9). 8.66 years
- 11). \$151,257.12
- 13). 7.3967%
- 15). 17.38 million people

6.3 Annuities and Sinking Funds

- 1). \$13,954.01
- 3). \$15,904.47
- 5). \$20,578.36
- 7). \$6,438.02
- 9). A lump sum of \$25,000 is better. $A = \$38002.64$
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$$17) a) A = \$30535.40 \quad b) m = \$720.63/\text{month}$$

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1). D

3). F

5). E

7). D

9a). B 9b). F

11). F

13). A

15). B

17). A

19). B

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- 11) $\$497897.83$
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- 16) $PV = P = \$1213539.16$ $FV = A = \$5745936.31$
- 17) $\$6669.70 = m$ 18) $\$767123287.67$
- 19) $m = \$2375.25$ 20) $109,619$
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Chapter 7: Sets and Counting

Answers to Odd Numbered Homework Problems and

Answers to all Problems in the Chapter Review Section

7.1 Sets

1). {Al, Bob}, {Al}, {Bob}, $\emptyset$ 3). {Bob, Chris, Dave}

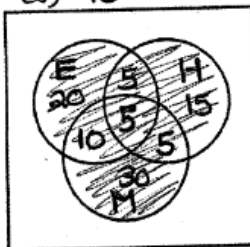
5). {a, e, i, f, h, c, g} 7). {b, d, j}

9). {1, 2, 3, 4, 5, 6} 11). $\emptyset$

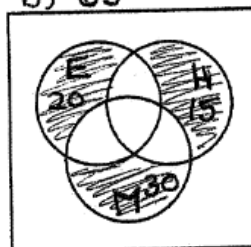
13). 9 students 15). 65

17). a. 30 b. 60 c. 10

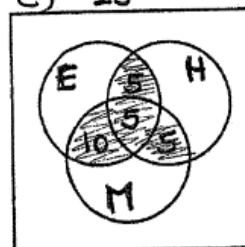
19) a) 90



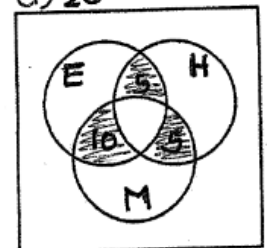
b) 65



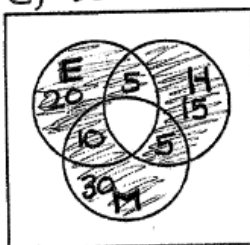
c) 25



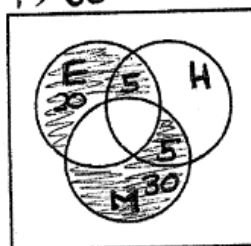
d) 20



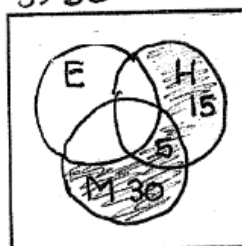
e) 85



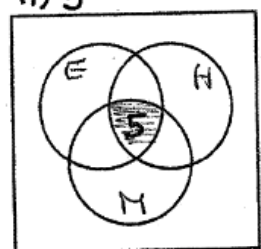
f) 60



g) 50



h) 5



7.2 Tree Diagrams and the Multiplication Axiom

- | | | |
|----------------|---------------|---------------------|
| 1). 6 | 3). 8 | 5). 12 |
| 7). 15,600,000 | 9). 6,400,000 | 11). BB, BG, GB, GG |
| 13). 16 | 15). 27,000 | 17) 10,000 |

7.3 Permutations

- | | | | |
|-------------------|------------------|----------------|------------|
| 1). 60 | 3). 210 | 5). 362,880 | 7). 25,200 |
| 9). 900 | 11). 48 | 13). 72 | 15). 2,400 |
| 17) 15,120 | 19) 5,040 | 21) 720 | |

7.4 Circular Permutations and Permutations with Similar Elements

- | | | | |
|-------------------|------------------|----------------|----------------|
| 1). 24 | 3). 120 | 5). 120 | 7). 64,864,800 |
| 9). 210 | 11). 6 | 13). 10 | 15). 210 |
| 17) 15,120 | 19) 5,040 | 21) 720 | |

7.5 Combinations

- | | | |
|---------|----------|-----------------------------|
| 1). 120 | 3). 10 | 5). 2,598,960 |
| 7). 66 | 9). 10 | 11). 20 |
| 13). 6 | 15). 924 | 17) 35 19) 84 |

7.6 Combinations Involving Several Sets

- | | | |
|--------------|-------------|------------|
| 1). 24 | 3). 25 | 5). 14,400 |
| 7). 4 | 9). 60 | 11). 80 |
| 13). 51 | 15). 7 | 17). 1,410 |
| 19). 171,600 | 21). 22,308 | 23). 24 |

$$25) (44C_4)(54C_5)(2C_1) \approx 8.586 \times 10^{11}$$

$$27) (80C_6)(20C_6) \approx 1.1647 \times 10^{13}$$

$$29) (6C_2)(7C_2)(4C_2) = 1890$$

$$31) (6C_3)(7C_2)(4C_1) = 1680$$

7.7 Binomial Theorem

- | |
|---|
| 1). $a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$ |
| 3). $x^5 - 10x^4y + 40x^3y^2 - 80x^2y^3 + 80xy^4 - 32y^5$ |
| 5). $2160x^4y^2$ 7). 280 9). 10 11). 64 |

7.8 Chapter Review

- | | | |
|---|-----------------------|-------------------------------|
| 1). 1,000 | 2). 20; 135; 15 | 3). 12 |
| 4). 144 | 5). 3,024 | 6). 11,639,628,000 |
| 7). 84 | 8). 60 | 9). 24 |
| 10). 126; 336; 210 | 11). 5,184 | 12). 1,048,576 |
| 13). 46,200 | 14). 60 | 15). 120 |
| 16). 20 | 17). 10 | 18). 1296 |
| 19). 27,720 | 20). 720 | 21). 194,594,400 |
| 22). a. 5148 b. 58,656 c. 123,552 d. 10,240 or 9216 | 23). 17,576 | |
| 24). 4500 | 25). 5040; 720 | 26). 3003; 371; 210; 191; 435 |
| 27). 10 | 28). 35 | 29). 72 |
| 30). 72,000 | 31). $-48384 x^5 y^3$ | 32). $2016 a^5 b^4$ |

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Chapter 8: Probability

Answers to Odd Numbered Homework Problems and Answers to all Problems in the Chapter Review Section

8.1 Sample Spaces and Probability

- 1). $\{1, 2, 3, 4, 5, 6\}$ 3). $\{1H, 2H, 3H, 4H, 5H, 6H, 1T, 2T, 3T, 4T, 5T, 6T\}$

5).

	1	2	3	4	5	6
1	(1, 1)	(1, 2)	(1, 3)	(1, 4)	(1, 5)	(1, 6)
2	(2, 1)	(2, 2)	(2, 3)	(2, 4)	(2, 5)	(2, 6)
3	(3, 1)	(3, 2)	(3, 3)	(3, 4)	(3, 5)	(3, 6)
4	(4, 1)	(4, 2)	(4, 3)	(4, 4)	(4, 5)	(4, 6)
5	(5, 1)	(5, 2)	(5, 3)	(5, 4)	(5, 5)	(5, 6)
6	(6, 1)	(6, 2)	(6, 3)	(6, 4)	(6, 5)	(6, 6)

- 7). $4/52$ 9). $13/52$ 11). $16/52$
 13). $6/20$ 15). $13/20$ 17). $3/8$
 19). $6/8$ 21). $2/8$ 23). $4/36$
 25). $7/36$ 27). $6/36$ 29). $8/12$
 31). $6/12$ 33). $1/16$

8.2 Mutually Exclusive Events and Addition Rule

- 1). Yes 3). No 5). No
 7). $16/52$ 9). $13/36$ 11). 40%
 13). $30/100$ 15). $94/100$ 17). $68/100$
 19). not mutually exclusive 21). 0
 23). 0.5 25). 40

8.3 Probability Using Trees and Counting

- | | | |
|----------------------------------|-----------------------------------|-----------------|
| 1). $20/56$ | 3). $6/56$ | 5). $1/6$ |
| 7). $3/10$ | 9). $10/220$ | 11). $56/220$ |
| 13). $45/1365$ | 15). $21/1365$ | 17). $324/1365$ |
| 19). $79092/2,598,960 = 0.03043$ | 21). $24/2,598,960 = 0.000009234$ | |
| 23). $1,584/2,598,960 = 0.006$ | 25). $1890/12376 = 0.1527$ | |
| 27). $1680/12376 = 0.1357$ | 29). $180/792 = 0.227$ | |
| 31). $21/792 = 0.0265$ | 33). 0.972864 | |

8.4 Conditional Probability

- | | | |
|----------------|-----------------------|----------------|
| 1). $4/12$ | 3). $1/3$ | 5). $30/44$ |
| 7). $6/54$ | 9). a. $1/6$ b. $1/4$ | 11). 0.12 |
| 13). 0.4 | 15). 0.696 | 17). $1/2$ |
| 19). $3/4$ | 21). $84/528$ | 23). $84/2096$ |
| 25). $188/796$ | | |

8.5 Independent Events

- | | | |
|--------------------------------------|---------------------------------------|----------|
| 1). $2/3$ | 3). $50/150$ | |
| 5). a. $3/4$ b. $2/4$ c. $2/4$ d. no | | |
| 7). 0.12 | 9). 0.36 | 11). yes |
| 13). a. $28/100$ b. $82/100$ | 15). a. $7/8$ b. $6/8$ c. $6/8$ d. no | |
| 17). a) yes b) 0.175 | 19). a) no b) 0.081 | |

8.6 Chapter Review

- | | | |
|---|-------------------------------------|----------------------|
| 1). $3/36$; $4/36$ | 2). $8/12$; $7/12$ | 3). $8/52$; $16/52$ |
| 4). $3/5$; $9/10$ | 5). $3/20$; $1/20$; $5/6$; $1/6$ | 6). $1/16$; $1/4$ |
| 7). $3/4$; 0 | 8). 0.72 | 9). 40% |
| 10). independent | 11). $3/4$; 0.45 | 12). 0.8144 |
| 13). 0.22 | 14). 0.45278 | |
| 15). a. $111540/2598960$; b. $949104/2598960$; c. $1349088/2598960$ d. $36/2598960$ | | |
| 16). $9/20$; $10/27$; $15/33$; $11/20$; no; yes | | 17). 0.40 |
| 18). $3/14$; $37/42$; $2/7$; $35/84$ | 19). no | 20). 0 |
| 21). 0.65 | 22). 0.36 | 23). $5/6$ |
| 24). 0.2 | 25). 0.5 | 26). 0.3 |

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Chapter 9: Probability

Answers to Odd Numbered Homework Problems and
Answers to all Problems in the Chapter Review Section

9.1 Binomial Probability

- | | | |
|-------------|---------------|-------------|
| 1). 0.2051 | 3). 0.0322 | 5). 0.9421 |
| 7). 0.2305 | 9). 0.5 | 11). 0.6778 |
| 13a) 0.0875 | 13b) 0.000097 | |
| 15a) 0.2785 | 15b) 0.613 | |

9.2 Bayes' Formula

- | | | |
|--------------------------|-----------|----------|
| 1). a. 0.6458 | b. 0.4706 | c. 0.625 |
| 3). the Republican party | | |
| 5). 0.7787 | | |
| 7). a. 0.045 | b. 0.2667 | c. 0.03 |
| 9a) 0.02 | 9b) 0.111 | |

9.3 Expected Value

- | | | |
|---|----------------|------------|
| 1). No; you can expect to lose \$3,000. | 3). 50 cents | |
| 5). 1.7 | 7). - 83 cents | 9). 39,000 |
| 11). - 96 cents | 13a) 1.35 | 13b) 405 |

9.4 Probability Using Tree Diagrams

- | | | |
|-------------------|------------------------|------------|
| 1). $\frac{3}{5}$ | 3). 0.94 | 5). 0.448 |
| 7). 0.6127 | 9). $\frac{125}{1296}$ | 11). 0.776 |

9.5 Chapter Review

- | | | |
|----------------------------|-----------------------------|---|
| 1). 0.3125; 0.1875 | 2). 0.088 | 3). 0.21094 |
| 4). 0.33696 | 5). 0.74432 | 6). 0.512 |
| 7). 0.52559 | 8). 4 | 9). $\frac{7}{18}$; $\frac{2}{3}$; $\frac{6}{11}$ |
| 10). 0.37975 | 11). $\frac{14}{17}$ | 12). 4.4%; $\frac{35}{44}$; 0.05 |
| 13). 0.62; $\frac{54}{62}$ | 14). 0.036; $\frac{28}{36}$ | 15). 69% |
| 16). \$7 | 17). -\$5.26 | 18). 25 |
| 19). 10% | 20). \$60,000 | 21). 29.167 |
| 22). \$5 | 23). $\frac{3}{8}$ | 24). 0.45 |
| 25). 0.957125 | 26). 0.027 | 27). $\frac{5}{9}$ |
| 28). $\frac{5}{8}$ | | |

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Chapter 10: Markov Chains

Answers to Odd Numbered Homework Problems and Answers to all Problems in the Chapter Review Section

10.1 Markov Chains

- 1). a. No b. No 3). a. $\begin{bmatrix} 0 & 1 \\ 1/2 & 1/2 \end{bmatrix}$ b. 1/2 c. 1/2 d. 3/4
5). a. 0.3 b. 0.38 c. 0.15 d. 0.175

10.2 Applications of Markov Chains

- 1) a). .93 b). .1 c). .1 d). .20
3) a). .2 b). .3 c). 0 d). .5
5) a) $T = \begin{matrix} & \begin{matrix} A & B & C & D \end{matrix} \\ \begin{matrix} A \\ B \\ C \\ D \end{matrix} & \begin{bmatrix} 0 & .3 & .5 & .2 \\ .5 & 0 & 0 & .5 \\ 0 & .1 & .7 & .2 \\ .2 & .4 & .1 & .3 \end{bmatrix} \end{matrix}$ b). .20 c). .25
d). .27 e). .7
f). 0

10.3 Regular Markov Chains

- 1) a) No b) No
3) a). .876 b). [.875 .125]
5) a). .548
b) [.14 .38 .48] after $n=2$ transitions
[.125 .312 .563] after $n=5$ transitions
c) [.125 .30 .575] long run distribution
d) same as (c)
7) a) See 10.2 #5 part (a) for T b) $m = (4-1)^2 + 1 = 16$
c) Yes
d) 15.67% visit site A, 19.8% site B, 35.71% site C, 28.82% site D
e) Highest to Lowest: C, D, B, A

10.4 Absorbing Markov Chains

1). a. 1 and 3

b).

$$\begin{matrix} & & 1 & 3 \\ 2 & \begin{bmatrix} 1/2 & 1/2 \\ 2/3 & 1/3 \end{bmatrix} \\ 4 & \end{matrix}$$

c). $2/3$

d). $1/2$

3). a).

$$\begin{matrix} & 0 & 1 & 2 & 3 & 4 \\ 0 & \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ .6 & 0 & .4 & 0 & 0 \\ 0 & .6 & 0 & .4 & 0 \\ 0 & 0 & .6 & 0 & .4 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \\ 1 & \\ 2 & \\ 3 & \\ 4 & \end{matrix}$$

b). Andre's solution matrix

$$\begin{matrix} & 0 & 4 \\ 1 & \begin{bmatrix} 57/65 & 8/65 \\ 9/13 & 4/13 \\ 27/65 & 38/65 \end{bmatrix} \\ 2 & \\ 3 & \end{matrix}$$

c). $27/65$

d). $27/65$

5). a).

$$\begin{matrix} & G & B & I \\ G & \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ .60 & .20 & .20 \end{bmatrix} \\ B & \\ I & \end{matrix}$$

b. I and II

c. $[0.75 \ 0.25]$

d. 0.75

7) a). $.445$ b). $.245$ c). $.26$

9). $.6691$ 11) 30.22% dropout, 69.78% graduate

12) $10/19$

10.5 Chapter Review – Markov Chains

1). No; no

2). 0.2: 0.3: 0.475

3). a. $\begin{bmatrix} 0 & 1 \\ 2/3 & 1/3 \end{bmatrix}$ b. 1 c. $2/3$

4) a) No b) Yes

5) a) .3 b) .31 c) .28

6) a) .32 b) $\begin{bmatrix} 2/3 & 1/3 \end{bmatrix}$

7) a) $[\text{.36 } \text{.34 } \text{.30}]$

b) $\begin{bmatrix} 3/7 & 9/28 & 1/4 \end{bmatrix}$

8). a. S1 and S2

b).

$$\begin{array}{c} \text{S3} \\ \text{S4} \end{array} \begin{bmatrix} \text{S1} & \text{S2} \\ 16/35 & 19/35 \\ 26/35 & 9/35 \end{bmatrix}$$

c). $26/35$

d). $19/35$

9). $2/7$

10). $3/7$

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Chapter 11 Game Theory

Answers to Odd Numbered Homework Questions and all Chapter Review Problems

11.1 Strictly Determined Games

- 1). a. The game is strictly determined. Optimal strategy for the row player is to always play row 1 and never row 2. In other words, his strategy is $\begin{bmatrix} 1 & 0 \end{bmatrix}$. The optimal strategy for the column player is to always to play column 1 and never to play column 2. We write it as $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$. When both players play their optimal strategy, the value of the game is 1.
- c. The game has no saddle point, therefore, it is not strictly determined.
- e. The game is strictly determined. The optimal strategy for the row player is to always play row 4, and never play any other row. We write his strategy as $\begin{bmatrix} 0 & 0 & 0 & 1 \end{bmatrix}$. The column player's strategy is $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$. The value of the game is 2.
- 3). a. $\begin{bmatrix} .05 & .10 \\ -.08 & -.12 \end{bmatrix}$
- b. The optimal strategy for the mayor is $\begin{bmatrix} 1 & 0 \end{bmatrix}$ and for his opponent is $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$. In other words, both candidates should oppose abortion rights.

11.2 Non-Strictly Determined Games

- 1). a. The optimal strategy for the row player is $\begin{bmatrix} 1/2 & 1/2 \end{bmatrix}$. The optimal strategy for the column player is $\begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix}$. The value of the game is 0.
- c. Optimal strategy for the row player is $\begin{bmatrix} 2/7 & 5/7 \end{bmatrix}$. The optimal strategy for the column player is $\begin{bmatrix} 6/7 \\ 1/7 \end{bmatrix}$. The value of the game is $16/7$.
- 3). a. $\begin{bmatrix} 2 & -3 \\ -3 & 4 \end{bmatrix}$
- b. Optimal strategy for the row player is $\begin{bmatrix} 7/12 & 5/12 \end{bmatrix}$. The optimal strategy for the column player is $\begin{bmatrix} 7/12 \\ 5/12 \end{bmatrix}$. The value of the game is $-1/12$.

11.3 Reduction by Dominance

1). $\begin{bmatrix} 2 & -1 \\ 0 & 3 \end{bmatrix}$, $R = [1/2 \quad 1/2 \quad 0]$, $C = \begin{bmatrix} 2/3 \\ 1/3 \end{bmatrix}$, The value = 1

3). $\begin{bmatrix} 1 & -2 \\ -2 & 4 \end{bmatrix}$, $R = [2/3 \quad 1/3 \quad 0]$, $C = \begin{bmatrix} 2/3 \\ 0 \\ 1/3 \end{bmatrix}$, The value = 0

5). $\begin{bmatrix} 0 & -4 \\ -2 & 4 \end{bmatrix}$, $R = [.6 \quad 0 \quad .4 \quad 0]$, $C = \begin{bmatrix} 0 \\ .8 \\ .2 \\ 0 \end{bmatrix}$, The value = -0.8

7). $\begin{bmatrix} 2 & -8 \\ 1 & 5 \end{bmatrix}$, $R = [0 \quad 2/7 \quad 5/7 \quad 0]$, $C = \begin{bmatrix} 0 \\ 0 \\ 13/14 \\ 1/14 \end{bmatrix}$, The value = 9/7

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1). a. $R = [0 \quad 1]$, $C = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$, value = 3 b. $R = [1 \quad 0 \quad 0]$, $C = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$, $v = -1$

c. $R = [0 \quad 1]$, $C = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$, value = 3 d. $R = [0 \quad 0 \quad 1 \quad 0]$, $C = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$, $v = 3$

2). a. $\begin{bmatrix} -5 & 10 \\ 5 & 10 \end{bmatrix}$ b. $R = [0 \quad 1]$, $C = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$, value = 5 cents

3). a. $\begin{bmatrix} 5 & 30 \\ -5 & 0 \end{bmatrix}$ b. $R = [1 \quad 0]$, $C = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$, value = 5%

4). a. $\begin{bmatrix} .14 & .08 & .11 \\ .12 & .11 & .11 \\ .06 & .09 & .10 \end{bmatrix}$ b. $[0 \quad 1 \quad 0]$, $\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$, or $[0 \quad 1 \quad 0]$, $\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$, value = .11

5). a. $\begin{bmatrix} -.02 & .03 \\ .01 & -.01 \end{bmatrix}$ b. stocks = 2/7, CD's = 5/7

11.4 Chapter Review

$$6). \text{ a. } \begin{bmatrix} 1/2 & 1/2 \end{bmatrix}, \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix}, \text{ value} = 0 \quad \text{b. } \begin{bmatrix} 5/9 & 4/9 \end{bmatrix}, \begin{bmatrix} 2/9 \\ 7/9 \end{bmatrix}, \text{ value} = 10/9$$

$$\text{c. } \begin{bmatrix} 5/7 & 2/7 \end{bmatrix}, \begin{bmatrix} 6/7 \\ 1/7 \end{bmatrix}, \text{ value} = 23/7 \quad \text{d. } \begin{bmatrix} 1/2 & 1/2 \end{bmatrix}, \begin{bmatrix} 4/7 \\ 3/7 \end{bmatrix}, \text{ value} = 1$$

$$7). 19/8; 14/9$$

$$8). \$11,000$$

$$9). \begin{bmatrix} 1/2 & 1/2 \end{bmatrix}, \begin{bmatrix} 2/3 \\ 1/3 \end{bmatrix}, v = 0$$

$$10). \text{ Pass} = 9/25, \text{ Run} = 16/25 \quad 11). \begin{bmatrix} 10/19 & 9/19 \end{bmatrix}, \text{ payoff} = 9.58 \text{ fish}$$

$$12). \begin{bmatrix} 1 & 0 \end{bmatrix}, \text{ payoff} = 2 \text{ points}$$

$$13). \text{ a. } \begin{bmatrix} -3 & 3 \\ 2 & -1 \end{bmatrix}, \begin{bmatrix} 0 & 1/3 & 2/3 \end{bmatrix}, \begin{bmatrix} 4/9 \\ 0 \\ 5/9 \end{bmatrix}, \text{ value} = 1/3$$

$$\text{b. } \begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}, \begin{bmatrix} 0 & 1/4 & 3/4 & 0 \end{bmatrix}, \begin{bmatrix} 1/2 \\ 1/2 \\ 0 \end{bmatrix}, \text{ value} = 5/2$$

$$\text{c. } \begin{bmatrix} 4 & 3 \\ -1 & 4 \end{bmatrix}, \begin{bmatrix} 5/6 & 0 & 1/6 & 0 \end{bmatrix}, \begin{bmatrix} 1/6 \\ 5/6 \\ 0 \\ 0 \end{bmatrix}, \text{ value} = 19/6$$

$$\text{d. } \begin{bmatrix} 2 & 1 \\ -2 & 1 \end{bmatrix}, \begin{bmatrix} 3/4 & 1/4 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \text{ value} = 1$$

$$\text{e. } \begin{bmatrix} 0 & 3 \\ 4 & -7 \end{bmatrix}, \begin{bmatrix} 11/14 & 0 & 0 & 3/14 \end{bmatrix}, \begin{bmatrix} 10/14 \\ 4/14 \\ 0 \\ 0 \end{bmatrix}, \text{ value} = 6/7$$

$$\text{f. } \begin{bmatrix} 0 & 2 \\ 2 & 0 \end{bmatrix}, \begin{bmatrix} 1/2 & 1/2 & 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1/2 \\ 1/2 \\ 0 \end{bmatrix}, \text{ value} = 1$$