INSTRUCTOR'S RESOURCE GUIDE AND SOLUTIONS MANUAL

to accompany

FINITE MATHEMATICS

Eighth Edition

Lial • Greenwell • Ritchey

PEARSON Addison Wesley

Boston San Francisco New York
London Toronto Sydney Tokyo Singapore Madrid
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21. 2560

22. \$611.57

23. No pennies are made of silver.

24. True

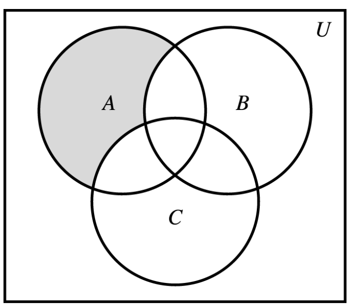
25. True

26. Valid

27. $q \rightarrow p$

28. **(a)** $\{b, c, f, g\}$ **(b)** $\{a, c, d, g\}$

29.



$A \cap (B' \cap C')$

30. 47

31. **(a)** $\{1H, 2H, 3H, 4H, 5H, 6H, 1T, 2T, 3T, 4T, 5T, 6T\}$
(b) $\frac{1}{4}$

32. 10,000

33. 60

34. $\frac{2}{55}$

35. **(a)** $\frac{1}{243}$ **(b)** $\frac{40}{243}$

36. $-\$.25$

37. **(a)** 65.1 **(b)** 70.5 **(c)** 71 **(d)** 66

38. 4.53

39. 4.24

40. $\approx .1938$

41. $\mu = 31$; $\sigma = 3.43$

42.
1. It must be a square matrix.
2. All entries must be between 0 and 1, inclusive.
3. The sum of the entries in any row must be 1.

43. $\begin{bmatrix} \frac{3}{4} & \frac{1}{4} \end{bmatrix}$

44. States 2 and 3

45. Yes; it is possible to move from state 1 into state 2 or state 3.

46. **(a)** Buy stocks **(b)** Buy money market

47. **(a)** \$2 from B to A **(b)** \$5 from A to B

48. $\begin{bmatrix} -6 & -4 \\ 7 & -8 \end{bmatrix}$

49. -1 at $(2, 3)$; value -1

50. \$1.04

Write the augmented matrix of the system.

$$\left[\begin{array}{cc|c} 10 & 20 & 500 \\ 30 & 10 & 750 \\ 5 & 10 & 250 \end{array}\right]$$

$$\begin{array}{r} \frac{1}{10}R_1 \to R_1 \\ \frac{1}{10}R_2 \to R_2 \\ \frac{1}{5}R_3 \to R_3 \end{array} \left[\begin{array}{cc|c} 1 & 2 & 50 \\ 3 & 1 & 75 \\ 1 & 2 & 50 \end{array}\right]$$

$$\begin{array}{r} -3R_1 + R_2 \to R_2 \\ -1R_1 + R_3 \to R_3 \end{array} \left[\begin{array}{cc|c} 1 & 2 & 50 \\ 0 & -5 & -75 \\ 0 & 0 & 0 \end{array}\right]$$

$$-\tfrac{1}{5}R_2 \to R_2 \quad \left[\begin{array}{cc|c} 1 & 2 & 50 \\ 0 & 1 & 15 \\ 0 & 0 & 0 \end{array}\right]$$

$$-2R_2 + R_1 \to R_1 \quad \left[\begin{array}{cc|c} 1 & 0 & 20 \\ 0 & 1 & 15 \\ 0 & 0 & 0 \end{array}\right]$$

The solution is $(20, 15)$. Hire the Garcia firm for 20 hr and the Wong firm for 15 hr.

46. Let $x =$ the number of chairs produced each week,
$y =$ the number of cabinets produced each week, and
$z =$ the number of buffets produced each week.

Make a table to organize the information.

	Chair	Cabinet	Buffet	Totals
Cutting	.2	.5	.3	1950
Assembly	.3	.4	.1	1490
Finishing	.1	.6	.4	2160

The system to be solved is

$$\begin{aligned} .2x + .5y + .3z &= 1950 \\ .3x + .4y + .1z &= 1490 \\ .1x + .6y + .4z &= 2160. \end{aligned}$$

Write the augmented matrix of the system.

$$\left[\begin{array}{ccc|c} .2 & .5 & .3 & 1950 \\ .3 & .4 & .1 & 1490 \\ .1 & .6 & .4 & 2160 \end{array}\right]$$

$$\begin{array}{r} 10R_1 \to R_1 \\ 10R_2 \to R_2 \\ 10R_3 \to R_3 \end{array} \left[\begin{array}{ccc|c} 2 & 5 & 3 & 19{,}500 \\ 3 & 4 & 1 & 14{,}900 \\ 1 & 6 & 4 & 21{,}600 \end{array}\right]$$

Interchange rows 1 and 3.

$$\left[\begin{array}{ccc|c} 1 & 6 & 4 & 21{,}600 \\ 3 & 4 & 1 & 14{,}900 \\ 2 & 5 & 3 & 19{,}500 \end{array}\right]$$

$$\begin{array}{r} -3R_1 + R_2 \to R_2 \\ -2R_1 + R_3 \to R_3 \end{array} \left[\begin{array}{ccc|c} 1 & 6 & 4 & 21{,}600 \\ 0 & -14 & -11 & -49{,}900 \\ 0 & -7 & -5 & -23{,}700 \end{array}\right]$$

$$-\tfrac{1}{14}R_2 \to R_2 \quad \left[\begin{array}{ccc|c} 1 & 6 & 4 & 21{,}600 \\ 0 & 1 & \frac{11}{14} & \frac{24{,}950}{7} \\ 0 & -7 & -5 & -23{,}700 \end{array}\right]$$

$$\begin{array}{r} -6R_2 + R_1 \to R_1 \\ \\ 7R_2 + R_3 \to R_3 \end{array} \left[\begin{array}{ccc|c} 1 & 0 & -\frac{5}{7} & \frac{1500}{7} \\ 0 & 1 & \frac{11}{14} & \frac{24{,}950}{7} \\ 0 & 0 & \frac{1}{2} & 1250 \end{array}\right]$$

$$2R_3 \to R_3 \quad \left[\begin{array}{ccc|c} 1 & 0 & -\frac{5}{7} & \frac{1500}{7} \\ 0 & 1 & \frac{11}{14} & \frac{24{,}950}{7} \\ 0 & 0 & 1 & 2500 \end{array}\right]$$

$$\begin{array}{r} \frac{5}{7}R_3 + R_1 \to R_1 \\ -\frac{11}{14}R_3 + R_2 \to R_2 \end{array} \left[\begin{array}{ccc|c} 1 & 0 & 0 & 2000 \\ 0 & 1 & 0 & 1600 \\ 0 & 0 & 1 & 2500 \end{array}\right]$$

The solution is $(2000, 1600, 2500)$. Therefore, 2000 chairs, 1600 cabinets, and 2500 buffets should be produced.

48. (a) Let x be the number of trucks used, y be the number of vans, and z be the number of station wagons. We first obtain the equations given here.

$$\begin{aligned} 2x + 3y + 3z &= 25 \\ 2x + 4y + 5z &= 33 \\ 3x + 2y + z &= 22 \end{aligned}$$

Write the augmented matrix and use row operations.

56. Here $P = 28,000,\ r = 11.5\% = .115$, and $I = 3255$.

Use the formula for simple interest.

$$\begin{aligned} I &= Prt \\ t &= \frac{I}{Pr} \\ &= \frac{3255}{28,000(.115)} \\ &\approx 1.011 \end{aligned}$$

The loan is for about 1.011 yr; convert this to months.

$$1.011 \text{ yr}\left(\frac{12 \text{ mo}}{1 \text{ yr}}\right) \approx 12.13 \text{ mo}$$

The loan is for about 12.13 mo.

58. $A = 7500,\ i = \frac{.10}{2} = .05,\ n = 3(2) = 6$

Let P represent the lump sum.

$$\begin{aligned} A &= P(1+i)^n \\ P &= \frac{A}{(1+i)^n} \\ &= \frac{7500}{(1.05)^6} \\ &\approx 5596.62 \end{aligned}$$

She should deposit about \$5596.62 today.

60. Suppose you receive \$6000/yr at age 55 until age 75. Then $R = 6000,\ i = .08$, and $n = 20$.

$$S = 6000\left[\frac{(1+.08)^{20}-1}{.08}\right] \approx 274,571.79$$

You would receive a total of \$274,571.79.

Suppose you receive \$12,000/yr at age 65 until age 75. Then $R = 12,000,\ i = .08$, and $n = 10$.

$$S = 12,000\left[\frac{(1+.08)^{10}-1}{.08}\right] \approx 173,838.75$$

You would receive a total of \$173, 838.75.

Receiving half the pension at 55 would produce the larger amount.

62. Use the formula for amortization payments with $P = 28,000,\ i = \frac{.12}{4} = .03$, and $n = 6\frac{1}{2}(4) = 26$.

$$R = \frac{Pi}{1-(1+i)^{-n}} = \frac{28,000(.03)}{1-(1.03)^{-26}} \approx 1566.27$$

The amount of each payment is \$1566.27.

64. Use the formula for compound amount with $P = 3250,\ i = .09$, and $n = 4$.

$$A = P(1+i)^n = 3250(1.09)^4 \approx 4587.64$$

Mark must pay back \$4587.64.

66. Use the formula for amortization payments with $P = 115,700,\ i = \frac{.105}{12} = .00875$, and $n = 300$.

$$\begin{aligned} R &= \frac{Pi}{1-(1+i)^{-n}} \\ &= \frac{115,700(.00875)}{1-(1+.00875)^{-300}} \\ &\approx 1092.42 \end{aligned}$$

Each monthly payment will be about \$1092.42. The total amount of interest will be

$$300(\$1092.42) - 115,700 = \$212,026.$$

68. **(a)** There is no interest with 0% financing, so the monthly payment is $31{,}500 \div 60 = \$525$.

(b) $P = 28{,}000, i = \dfrac{.049}{12}, n = 48$

$$\begin{aligned} P &= R\left[\frac{1-(1+i)^{-n}}{i}\right] \\ 28{,}000 &= R\left[\frac{1-(1+\frac{.049}{12})^{-48}}{\frac{.049}{12}}\right] \\ R &\approx 643.55 \end{aligned}$$

At 4.9% for 48 months, the monthly payment is \$643.55 and the total amount paid back is $643.55 \times 48 = \$30{,}890.40$.

$P = 28{,}000,\ i = \dfrac{.055}{12},\ n = 60$

$$\begin{aligned} P &= R\left[\frac{1-(1+i)^{-n}}{i}\right] \\ 28{,}000 &= R\left[\frac{1-(1+\frac{.055}{12})^{-60}}{\frac{.055}{12}}\right] \\ R &\approx 534.83 \end{aligned}$$

38. Again, let x represent the number of flies that are killed.

$n = 100; x = 975, 976, \ldots, 980; p = .98$

As in Exercise 36, $\mu = 980$ and $\sigma = \sqrt{19.6}$. To find $P(\text{at least } 975)$, find the z-score for $x = 974.5$.

$$z = \frac{974.5 - 980}{\sqrt{19.6}} \approx -1.24$$

$$\begin{aligned} P(z > -1.24) &= 1 - P(z < -1.24) \\ &= 1 - .1075 \\ &= .8925 \end{aligned}$$

40. (a) Find the mean.

$$\overline{x} = \frac{\sum x}{n} = \frac{126}{10} = 12.6$$

The mean is 12.6.
To find the median, list the values from smallest to largest.

$$5, 9, 11, 11, 12, 12, 13, 15, 17, 21$$

The median is the mean of the two middle values.

$$\frac{12 + 12}{2} = 12.$$

The median is 12.
There are two values that appear twice in the list, 11 and 12, so the modes are 11 and 12.

(b) Use a graphing calculator or spreadsheet to find the standard deviation.

$$s \approx 4.3767$$

The standard deviation is 4.3767.

(c) $\overline{x} + s = 12.6 + 4.3767 = 16.9767$
$\overline{x} - s = 12.6 - 4.3767 = 8.2233$

Seven of the 10 entries fall between these two values.
Thus $\frac{7}{10}(100) = 70\%$ of the data are within one standard deviation of the mean.

(d) $\overline{x} + 3s = 12.6 + 3(4.3767) = 25.7301$
$\overline{x} - 3s = 12.6 - 3(4.3767) = -.5301$

All of the data fall between these two values, so 100% of the data are within three standard deviations of the mean.

42. No more than 35 min/day

$\mu = 42,\ \sigma = 12$

Find the z-score for $x = 35$.

$$z = \frac{35 - 42}{12} \approx -.58$$

$P(x \le 35) = P(z \le -.58) = .2810$

28.10% of the residents commute no more than 35 min/day.

44. Between 38 and 60 min/day

$\mu = 42,\ \sigma = 12$

Find the z-scores for $x = 38$ and $x = 60$.

For $x = 38$,

$$z = \frac{38 - 42}{12} \approx -.33.$$

For $x = 60$,

$$z = \frac{60 - 42}{12} = 1.5.$$

$$\begin{aligned} P(38 \le x \le 60) &= P(-.33 \le z \le 1.5) \\ &= P(z \le 1.5) - P(z \le -.33) \\ &= .9332 - .3707 \\ &= .5625 \end{aligned}$$

56.25% of the residents commute between 38 and 60 min/day.

46. $n = 500, p = .555$
$\mu = np = 500(.555) = 277.5$

$$\begin{aligned} \sigma &= \sqrt{np(1-p)} \\ &= \sqrt{500(.555)(.445)} \\ &\approx 11.11 \end{aligned}$$

$$\begin{aligned} P(x > 300) &= P\left(z > \frac{300.5 - 277.5}{11.11}\right) \\ &= P(z > 2.07) \\ &= 1 - .9808 \\ &= .0192 \end{aligned}$$