

## Chapter 8

1) This example will help you do exercises 1-14 on pp.457-8.

Which of the following are statements?

- a) Today is Saturday.
- b)  $5 < 7$
- c) Did you vote today?
- d)  $2^{2^{16,091}} - 1$  is prime.
- e) Sit down!
- f) "Dawson's Creek" is a great TV program.
- g)  $x + 1 = 7$

2) This example will help you do exercises 49-54 on p. 458.

Translate each sentence to symbolic form if

p: Bill is tall

q: Maria is tall

- a) Bill is tall and Maria is tall.
- b) It is not true that both Bill and Maria are tall.
- c) Bill is not tall or Maria is not tall.

3) This example will help you do exercises 1-4, 7-18, 21-29 on p. 470.

Let p represent a true statement and let q and r represent false statements. Find the truth value of

$\sim [\sim r \vee (p \wedge \sim q)]$ .

4) This example will help you do exercises 47-62 on p. 471.

Construct a truth table for each compound statement.

a)  $\sim (p \vee q)$

b)  $\sim p \wedge \sim q$

5) This example will help you do exercises 63-72 on p. 471.

Use DeMorgan's Laws to write the negation of the following statement:

It is not Thursday or Maria is late.

6) This example will help you do exercises 55-66 on p. 480.

Construct a truth table for  $(p \rightarrow q) \wedge (q \rightarrow p)$

7) This example will help you do exercises 21-26 on p. 480 and exercises 45-50 on p. 489.

Determine the truth value:

a)  $1 + 1 = 3 \rightarrow 9 = 3$

b)  $1 + 1 = 3 \rightarrow 9 = 4$

c) 2 is odd if and only if Miami is in Broward county.

8) This example will help you do exercises 55-66 on p. 480.

Construct a truth table for

a)  $p \vee \sim p$

b)  $(\sim p \rightarrow q) \leftrightarrow [(p \wedge q) \vee r]$

9) This example will help you do exercises 55-66 on p. 480.

Which of the statements in the previous problem is a tautology?

10) This example will help you do exercises 1313-24 and 27-34 on pp. 507-8.

a) If it is raining, then this is December. It is raining. Therefore, this is December.

b) If you are a derf, then you are a gork. If you are not a gork, then you are a floozle. You are not a floozle. Therefore, you are not a derf.

### Section 9.1

1) This example will help you do exercises 37, 38, 43, and 44 on p. 522.

$A = \{1, 2, 3\}$ ,  $B = \{3, 4, 5\}$ ,  $C = \{4, 5\}$ . Find:

a)  $A \cap B$    b)  $B \cap C$    c)  $A \cap C$    d)  $A \cup B$    e)  $B \cup C$    f)  $A \cup C$    g)  $A \cup (B \cap C)$

2) This example will help you do exercises 39-42 on p. 522.

$U = \{a, e, i, o, u\}$ ,  $A = \{a, e, o\}$ ,  $B = \{e, i\}$ . Find:

a)  $A'$                       b)  $A \cup B'$

3) This example will help you do exercises 13-20 on p. 522.

List all the subsets of  $\{A, B, Rh\}$

4) This example will help you do exercises 21, 22 on p. 522.

How many subsets does  $\{A, B, C, D\}$  have?

5) This example will help you do exercises 45-57 on p. 522.

$U = \{\text{all FIU students}\}$ ,  $M = \{\text{male FIU students}\}$ ,

$F = \{\text{students taking Finite Math at FIU}\}$

Describe each set in words:

a)  $M'$                       b)  $M \cup F$                       c)  $M' \cap F'$

### Section 9.2

1) This example will help you do exercises 1-8, 11-16 on p. 530.

Sketch a Venn diagram to show each of the following sets:

a)  $(A \cup B)'$                       b)  $A \cup (B' \cap C)$

2) This example will help you do exercises 19-21, 23, and 24 on pp. 531-2.

At the University of Gatorville there are 27 players on the soccer team.

17 are on academic probation

10 have an arrest record

14 have cheated in class

5 have an arrest record and are on academic probation

5 have cheated and have an arrest record

9 have cheated and are on academic probation

4 fall into all three categories

How many players:

a) fall into none of the three categories?

b) did not cheat?

c) cheated, but did not have an arrest record?

d) fell into exactly one of the three categories?

3) This example will help you do exercises 25-28 on p. 532.

Ernst and Whinney surveyed 52 insurance companies. The table below classifies them according to type of company (mutual or stock) and whether or not their company had either merged with or acquired another company during the last one, two, or five years. (Source: *Journal of Accounting*, January 1988, p.136)

| Merger/acquisition activity | Mutual companies | Stock companies |
|-----------------------------|------------------|-----------------|
| During the preceding        | A                | B               |
| One year, C                 | 8                | 9               |
| Two years, D                | 4                | 0               |
| Five years, E               | 3                | 6               |
| None during this period, F  | 14               | 8               |

Find the number of companies in each set:

a)  $D \cap A$                       b)  $D \cup A$                       c)  $B' \cup F$

### Section 9.3

1) This example will help you do exercises 17-22 on p. 540.

Roll a fair die.

a)  $P(5)$       b)  $P(1)$       c)  $P(\text{even})$       d)  $P(1 \text{ or } 5)$       e)  $P(\text{even or odd})$       f)  $P(7)$

2) This example will help you do exercises 11-16 on p. 540.

A pair of dice is rolled. What is the probability that the sum is:

a) 3?      b) 7?      c) 3 or 7?      d) 1?

3) This example will help you do exercises 23-30 on p. 540.

A card is drawn from a standard 52-card deck. Find the probability of drawing a:

a) seven    b) diamond    c) red card    d) ace of spades    e) queen or king    f) black jack

4) This example will help you do exercises 31, 32, 35 on p. 540-1.

A survey of 110 recent college graduates indicated the following starting salaries:

| <u>SALARY</u>      | <u>Number of occurrences</u> |
|--------------------|------------------------------|
| under \$20,000     | 10                           |
| \$20,000- \$29,999 | 47                           |
| \$30,000- \$39,999 | 38                           |
| \$40,000- \$49,999 | 11                           |
| \$50,000 or more   | 4                            |

What is the probability that a college graduate has a starting salary under:

a) \$20,000?      b) \$40,000?

5) This example will help you do exercises 3-8 on p. 539.

Write out an equally likely sample space for the experiment of tossing 3 coins. Then write the indicated events in set notation.

a) the first coin shows a head  
b) exactly two tosses show tails  
c) at least two tosses show tails



## Section 9.5

1) This example will help you do exercises 1-3 on p. 563.

Two coins are tossed. What is the probability of obtaining:

a) two heads?

b) two heads if we know that at least one of the coins is a head?

2) This example will help you do exercises 4-6 on p. 563.

Two dice are tossed. Find the probability of rolling:

a) a sum of 8, given that “doubles” were tossed.

b) exactly one die showing 2, given that the sum of the dice is 5.

c) exactly one die showing 5, given that both dice show 4s.

3) This example will help you do exercises 25-32, 46-53 on pp. 564-5.

A survey of 100 individuals asked two questions: “Have you seen an advertisement for SuperWhite toothpaste in the last month?” and “Did you buy SuperWhite toothpaste in the last month?” The results of this survey are shown in the table.

|             | Buy | Not Buy |
|-------------|-----|---------|
| Seen Ad     | 15  | 25      |
| Not Seen Ad | 10  | 50      |

Find the probability that a person:

a) saw the ad.

b) saw the ad and bought the toothpaste.

c) did not buy the toothpaste.

d) who saw the ad bought the toothpaste.

e) who didn't buy the toothpaste failed to see the ad.

4) This example will help you do exercises 7-10 on pp. 563.

Two playing cards are selected *without* replacement from a standard 52-card deck. Find the probability that:

a) the second is a heart, given that the first is a spade.

b) the first card is a spade and the second card is a heart.

5) Two playing cards are selected *with* replacement from a standard 52-card deck. Find the probability that:

a) the second is a heart, given that the first is a spade.

b) the first card is a spade and the second card is a heart.

c) the second card is a heart.

6) This example will help you do exercises 40-42, 60-62 on pp. 564-6.

An insurance company conducted a survey of drivers concerning drinking and driving. The table shows the resulting frequencies, where A represents drivers who have had an accident and D represents drivers who are drinkers.

|        | D   | D'  | Totals |
|--------|-----|-----|--------|
| A      | .42 | .13 | .55    |
| A'     | .16 | .29 | .45    |
| Totals | .58 | .42 | 1.00   |

Are A and D independent events?

7) This example will help you do exercises 34-39 on p. 564.

In the previous example, find  $P(A \cup D)$  and  $P(A' | D')$ .

8) This example will help you do exercises 21-24 on pp. 563.  
In a community, 55% of the registered voters are Republican and the rest are Democrats. A survey shows that 80% of the Republicans favor candidate Suarez and 40% of the Democrats favor candidate Suarez. Find the probability that a randomly selected registered voter:

- a) favors candidate Suarez.
- b) is a Republican Suarez supporter.

9) This example will help you do exercises 43-45, 54-56 on p. 565.  
The probability that a student passes Finite Math on the first try is .4. The probability that a student who fails on the first try will pass on the second is .5. The probability that a student who fails the first and second tries will pass on the third try is .6. Find the probability that a student:

- a) fails both the first and second tries.
- b) will fail three times in a row.
- c) will require at least two tries to pass Finite Math.

10) This example will help you do exercises 57, 58a, 59a on p. 565.  
What is the probability of rolling five straight sixes with a fair die?

11) A jar contains one blue marble and three gold marbles. Two marbles are drawn at random *without* replacement. Let  $B_1$  = the event that the 1<sup>st</sup> marble is blue and  $B_2$  = the event that the 2<sup>nd</sup> marble is blue.

- a) Are  $B_1$  and  $B_2$  mutually exclusive?
- b) Are  $B_1$  and  $B_2$  independent?

12) A pollster would like to determine the percentage of students at a local high school who smoke marijuana at least once a week. One hundred students were asked to answer the questionnaire below. Suppose that of these 100 students, 32 responded with a yes answer. What is the pollster's estimate of the percentage of students at this school who smoke marijuana at least once a week?

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## CONFIDENTIAL MARIJUANA SURVEY

Instructions:

1. Toss a coin.

- If the coin turns up a head, answer question A.
- If the coin turns up a tail, answer question B.

A) Do you smoke marijuana at least once a week?

B) Is the last digit of your social security number a 0, 2, 4, 6, or 8?

2. Indicate your answer by circling either yes or no.

Do not indicate which question you are answering.

**YES**                      **NO**

Return anonymously.

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## Section 9.6

1) This example will help you do exercises 9-18, 22, 23, 27 on pp. 570-72.

A survey shows that 41% of New Yorkers were born there. Of those natives, 49% say their favorite baseball team is the Yankees and 45% say the Mets. Of transplants living in New York, 22% say their favorite team is the Yankees and 31% say the Mets. A New Yorker is chosen at random and replies that she is a Mets fan. What is the probability that she was born in New York?

2) This example will help you do exercises 20, 21, 24-26 on pp. 571-2.

A do-it-yourself pregnancy detection kit has been tested for accuracy. The probability of a woman testing positive if she is actually pregnant is .95 and the probability of her testing positive if she is not pregnant is .25. It is estimated that 80% of the woman who use the kit are pregnant. Find the probability that a woman who tests positive actually is pregnant.

3) This example will help you do exercises 19, 28-35 on p. 571-2.

A fast-food restaurant chain with 700 outlets in the United States describes the geographical location of its restaurants with the accompanying table of percentages. The regions are given across the top and the populations of the cities are given down the left side.

|                | NE  | SE  | SW  | NW |
|----------------|-----|-----|-----|----|
| Under 10,000   | 5%  | 6%  | 3%  | 0% |
| 10,000-100,000 | 15% | 15% | 12% | 5% |
| Over 100,000   | 20% | 4%  | 10% | 5% |

A restaurant is chosen at random from the southwest region. What is the probability that it is located in a city with population over 100,000?

## **Section 10.1**

1) This example will help you do exercises 1-4 on p.588

Suppose we toss a coin 3 times and let  $X$  = the number of times it lands on heads.

- What are the possible values of  $X$ ?
- Find the probability that each value of  $x$  occurs.

2) This example will help you do exercises 9-12 on p.589

Find the expected value of the random variable.

|        |    |     |    |     |    |
|--------|----|-----|----|-----|----|
| $Y$    | 1  | 2   | 4  | 8   | 16 |
| $P(Y)$ | .3 | .25 | .2 | .15 | .1 |

3) This example will help you do exercises 26-30 on p.590

What is wrong with this probability distribution?

|        |    |    |     |     |
|--------|----|----|-----|-----|
| $X$    | -2 | 0  | 2   | 4   |
| $P(X)$ | .3 | .1 | -.5 | 1.1 |

4) This example will help you do exercises 31-35 on p.590

Fill in the missing value to make a valid probability distribution.

|        |    |    |   |    |    |
|--------|----|----|---|----|----|
| $X$    | -3 | -1 | 1 | 2  | 5  |
| $P(X)$ | .1 | .2 |   | .3 | .1 |

5) This example will help you do exercises 17-20 on p.589

An online gambling site offers a first prize of \$25,000 and three second prizes of \$5000 each for registered users when they place a bet. One million bets are received in the contest. Find the expected winnings if you can place one registered bet of \$1 in the given period.

6) This example will help you do exercise 37 on p.591

A life insurance company has written a one year policy for \$80. According to mortality tables, the probability that the person who purchases the policy will die in one year is 0.0007. If the policy pays \$25,000 if the person dies within the year, what is the company's expected gain?

## Section 10.2

Examples 1-4 will help you do exercises 23-36 on pp. 603-4.

1) At a certain TV station, the news director wants to hire 2 news anchorpersons, one male and one female. If she is considering 5 men and 3 women for the top two positions, how many different anchor teams could she hire?

2) All of a sudden the sportscaster quits, and now the news director has to hire a third person. If there are 2 applicants for the sports position, how many different ways can the news director hire 2 anchors and a sportscaster?

3) As the news director is interviewing her prospective anchors and sportscaster, her weatherman dies. Five meteorologists apply for this job. How many different ways can the news director choose her new 4-person news team?

4) The Florida Lottery's Cash 3 game consists of selecting 3 digits (from 0-9) in a given order, allowing for repetition of digits. For instance, 8-0-8 is considered a different result than 8-8-0. If you pick only one sequence of 3 digits, your probability of matching the sequence chosen by the state is one over \_\_\_\_\_.

5) This example will help you do exercise 8 on p. 603.

How many permutations are there of the letters MATH?

6) Examples 6 and 7 will help you do exercises 1, 5, 11, 12, 38-45 on pp. 603-4.

How many permutations are there of the set {a, b, c, d, e} taken three at a time?

7) This example will help you do exercises 33-40 on p. 460.

Ten horses are entered in the Kentucky Derby. Bettors are only interested in who finishes first, second, and third. In how many different ways can the race end if only the top three finishers are recorded?

8) How many 3-element subsets does {a, b, c, d} have?

9) A drawing is held to determine which of 100 entrants will win three prizes. First prize is \$1000, second prize is \$500, and third prize is \$100. How many possible ways can the 3 winners be drawn?



10) A drawing is held to determine which of 100 entrants will win three prizes. Each prize is \$100. How many possible ways can the 3 winners be drawn?

11) The Florida Lottery's Lotto game consists of selecting 6 numbers (from 1-49), without repetition, and without regard to the order. That is, 6-14-29-31-32-45 is considered the same selection as 29-32-14-31-45-6. If you pick only one selection of 6 numbers, your chances of matching the 6 selected by the state are one in \_\_\_\_\_.

12) A congressional committee consisting of 10 Democrats and 8 Republicans wants to choose a subcommittee consisting of 3 Democrats and 2 Republicans. In how many ways can this be done?

13) In poker, each player is dealt 5 cards from a standard 52-card deck. How many different 5-card poker hands are there?

14) In poker, "4-of-a-kind" consists of 4 cards of one denomination and one card from a different denomination. How many 5-card hands consist of 4 jacks and one seven?

15) How many different ways can you be dealt "4-of-a-kind"?

16) A coin is tossed 6 times.

a) How many sequences of heads and tails are possible?

b) How many of the sequences in (a) contain 2 heads?

c) How many of the sequences in (a) contain at most 2 heads?

17) A student has a 10-question true-false test to take. He learned (from a friend that took the same test earlier in the day) that exactly 7 of the answers are true. The trouble is, he doesn't know which 7 are true. How many ways can he guess which 7 to answer true?

### **Section 10.3**

1) Five cards are dealt from a standard 52-card deck. What is the probability of getting:

a) 5 spades?            b) 3 sevens and 2 kings?            c) no more than one ace?

d) at least one spade?            e) 2 queens and 2 kings?

2) A shipment of 10 transistors contains 3 with defects. Find the probability that a sample of size 4, drawn from the 10, will not contain a defective.

3) In Lotto, what is the probability of winning 2<sup>nd</sup> prize (matching 5 of Florida's 6 winning numbers)?

### **Section 10.4**

1) A coin is tossed 5 times. What is the probability of getting exactly 2 heads?

2) A new skin medication cures acne 80% of the time. If 4 randomly selected people use this cream, what is the probability that all 4 are cured of acne?

- 3) Past experience shows that 65% of the applicants for a job will be qualified. If 4 people apply for the job, what is the probability that at least one is qualified?
- 4) A binomial experiment is performed in which the probability of a success is  $p = .3$ . If S denotes a success and F denotes a failure, what is the probability that the sequence SFSSSF occurs?
- 5) A binomial experiment consists of 6 trials with  $p = .3$ . Find  $P(\text{number of successes} = 4)$ .
- 6) An airline advertisement claims that its flights are on time 80% of the time. A businessman takes a trip that includes 5 flights on that airline. Assuming the advertisement's claim is correct, find the probability that:
- a) at most one of the five flights is late.      b) no more than 4 of the 5 flights is late.

### Section 11.1

1) This example will help you do exercises 1-4 on pp. 654-5.

For the data below:

- a) group the data using 50-59 as the first interval  
 b) prepare a frequency distribution with columns for intervals and frequencies  
 c) construct a histogram

|    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|
| 74 | 71 | 99 | 52 | 81 | 51 | 86 |
| 70 | 83 | 74 | 77 | 64 | 95 |    |
| 93 | 57 | 89 | 75 | 56 | 95 |    |
| 58 | 65 | 60 | 51 | 57 | 74 |    |

2) This example will help you do exercises 9-13, 18-30 on pp. 655-6.

Find the mean, median, and mode of:

- a) 3, 7, 5, 4, 3, 2, 7, 1, 3, 0, 6  
 b) 1, 2, 3, 4  
 c) 1, 2, 3, 4000

3) This example will help you do exercises 23-28 on pp. 655-6.

Find the mode of 1, 1, 2, 3, 4, 5, 5

4) This example will help you do exercises 14-17 on p. 655.

Find the mean:

| <u>Value</u> | <u>Frequency</u> |
|--------------|------------------|
| 1            | 3                |
| 3            | 7                |
| 5            | 2                |
| 7            | 4                |
| 9            | 4                |

## Section 11.2

1) This example will help you do exercises 3-10 on p. 664.

Find the range of each set:

- a) 13, 38, -2, 14, 58, 7, 14
- b) 1, 48, 49, 50, 51, 52, 100
- c) 1, 15, 30, 45, 60, 80, 100

2) This example will help you do exercises 24-29 on pp. 665-6

The number of Americans (in millions) with taxable earnings in 1985-1992 is given. (Source: *Statistical Abstract of the United States*, 1994)

- a) Find the mean number (in millions) of workers with taxable earnings in this period. Which year(s) is closest to this mean?
- b) Find the standard deviation for the data.
- c) In how many of these years is the number of workers with taxable earnings within 1 standard deviation of the mean?
- d) How many standard deviations from the mean is the largest number of workers with taxable earnings?

| <b>Year</b> | <b>Workers w/ taxable earnings</b> |
|-------------|------------------------------------|
| 1985        | 120                                |
| 1986        | 123                                |
| 1987        | 126                                |
| 1988        | 130                                |
| 1989        | 132                                |
| 1990        | 133                                |
| 1991        | 132                                |
| 1992        | 132                                |

3) By observation, estimate the standard deviation:

- a) 5, 5, 5, 5, 5, 5
- b) 4, 4, 4, 6, 6, 6

## Section 11.3

1) What percent of the area under the curve lies to the right of the mean?

2) A score is chosen at random. What is the probability that it lies to the right of the mean?

3) What percent of the area under the curve lies between  $\mu - \sigma$  and  $\mu + \sigma$ ?

4) Suppose a score is chosen at random. What is the probability that it lies within one standard deviation of the mean?

5) This example will help you do exercises 9-14 on p.680

Z denotes the standard normal random variable. Find:

- a)  $P(0 \leq Z \leq 1.95)$
- b)  $P(-2 \leq Z \leq 0)$
- c)  $P(Z \leq .79)$
- d)  $P(Z \geq 1.3)$
- e)  $P(1.11 \leq Z \leq 2.49)$
- f)  $P(-.03 \leq Z \leq 1.98)$
- g)  $P(Z \geq 5.9)$
- h)  $P(Z \geq -4.88)$

6) Let  $X$  be a normal random variable with  $\mu = 0.51$  and  $\sigma = 0.23$ . Find:

a)  $P(X \leq .65)$

b)  $P(-.65 \leq X \leq -.15)$

7) This example will help you do exercises 22-30 on p. 680.

Suppose the annual rainfall in Statville is known to be normally distributed with a mean of 35.5 inches and a standard deviation of 2.5 inches. In a randomly selected year, what is the probability that the rainfall exceeds 41 inches?

8) Without using the table, find:

$$P(Z < -3) + P(-3 \leq Z \leq -1) + P(-1 < Z \leq 2) + P(Z > 2)$$

### **Section 11.4**

1) A fair coin is tossed 100 times. What is the probability that we get:

a) between 40 and 60 heads, inclusive?

b) exactly 50 heads?

2) The admissions office at Slippery Rock University knows from past experience that 60% of all high school applicants will enroll as freshmen. If 1200 high school students apply for admissions for next year, what is the probability that no more than 750 will enroll?

### **Section 1.6**

1) This example will help you do exercises 61-62 on p. 54.

The approximate annual interest rate  $A$  of a loan paid off with monthly payments is given by

$$A = \frac{24f}{b(p+1)}$$

where  $f$  is the finance charge on the loan,  $p$  is the total number of payments, and  $b$  is the original balance of the loan. If  $A = 11\%$ ,  $f = \$400$ , and  $p = 36$ , find  $b$  to the nearest whole number.

2) This example will help you do exercises 77-80 on p. 56.

The length of a rectangle is 8 inches less than twice its width. If the perimeter is 50 inches, find the width.

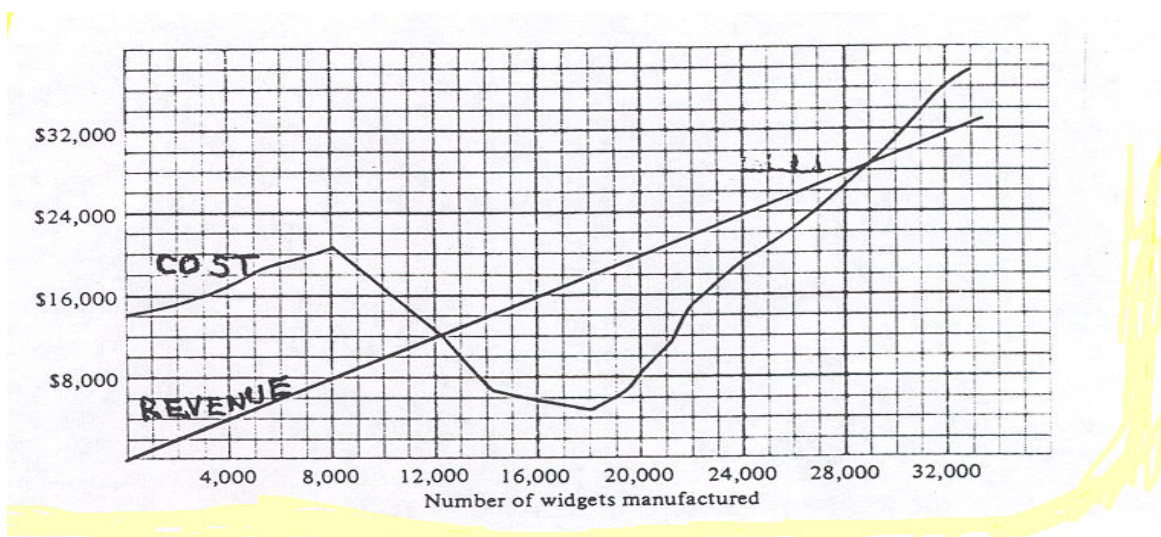
3) This example will help you do exercises 64-67 on p. 55.

Maria invested her \$10,000 inheritance in two ways: some at 5% interest and some at 3% interest. Altogether, she makes \$460 per year interest. How much did she invest at 5%?

4) After deductions for taxes, retirement, health insurance, and a dental plan, Willie's net weekly income is \$594. If the deductions total 34% of his gross weekly income, what is his gross weekly income?

## Section 2.1

- 1) What do the coordinates of all the points on the x-axis have in common?
- 2) What do the coordinates of all the points on the y-axis have in common?
- 3) Find the x-intercept and y-intercept of the graph of  $2x - 3y = 12$ .
- 4) Determine whether  $\left(\frac{1}{2}, -\frac{3}{2}\right)$  is a solution of  $4x + 6y = 11$ .
- 5) The weekly revenue and costs for the Westco Widget Company are shown in the graph.



- a) Determine the weekly costs if 10,000 widgets are manufactured.
- b) Determine the weekly revenue if 10,000 widgets are manufactured.
- c) Determine the weekly profit (or loss) if 10,000 widgets are manufactured.
- d) For what weekly production totals will the company break even?
- e) What is the largest number of widgets that can be manufactured without losing money?

## Section 2.2

- 1) This example will help you do exercises 1-8 on pp. 92-3.  
Find the slope of the line passing through  $(-6, -3)$  and  $(-5, 10)$ .
- 2) This example will help you do exercises 27-32 on p. 93.  
Sketch the graph of  $-2x + 3y = 5$  and label its intercepts.
- 3) This example will help you do exercises 9-14 on p. 93.  
Find an equation of the line with y-intercept 3 and  $m = -5$ .
- 4) This example will help you do exercises 15-21, 23 on p. 93.  
Find the slope and y-intercept of the line whose equation is  $5x - 8y = 10$ .

5) This example will help you do exercise 22 on p. 93.

Graph and find the slope:

a)  $x = -1$

b)  $y - 3 = 0$

6) This example will help you do exercises 41-52 on pp. 93.

Find the equation of the line that passes through  $(-2, 3)$  and  $(-1, -5)$ . Write your final answer in the form  $y = mx + b$ .

7) This example will help you do exercises 53-62 on pp. 93-4.

Find the equation of the line:

a) perpendicular to  $3x + 2y = 7$  and passing through the point  $(0, 6)$ .

Write your final answer in the form  $y = mx + b$ .

b) parallel to  $y = -1$  and passing through  $(2, 1)$ .

8) This example will help you do exercises 67-70 on p. 94.

Using data from the National Center for Health Statistics (*Source: World Almanac and Book of Facts, 1996*), the life expectancy of an American can be approximated by the equation  $y = .101x + 74.45$ , where  $y$  is in years and  $x$  represents the year of birth with  $x = 0$  being 1982.

a) In what year will the life expectancy of a U.S. newborn reach 77 years?

b) What does the slope of the line tell us?

### Section 2.3

1) This example will help you do exercises 1-4 on p. 103.

The relationship between the Celsius and Fahrenheit temperature scales is known to be linear.

The boiling point of water is  $212^\circ\text{F}$  or  $100^\circ\text{C}$ . The freezing point of water is  $32^\circ\text{F}$  or  $0^\circ\text{C}$ .

a) Find an equation giving the Celsius temperature in terms of the Fahrenheit temperature.

b) Convert  $90^\circ\text{F}$  to Celsius.

c) Convert  $15^\circ\text{C}$  to Fahrenheit.

2) This example will help you do exercises 5, 6, 8, 10 on pp. 103-4.

The January sales of computer and computer software stores in the United States were \$628 million in 1993 and \$1973 million in 1999.

(Source: <http://www.economagic.com/em-cgi/data.exe/cenret/rt20> )

Let  $x = 0$  represent 1993 and assume that the sales are approximated by a linear equation.

a) Find an equation giving the January sales.

b) Use this equation to approximate the sales in 2001.

c) When will sales reach \$3300 million?

3) This example will help you do exercises 27-34 on p. 105.

The profit (in millions of dollars) from the sale of  $x$  million units of LiquiMints is given by  $p = .6x - 19.7$ . The cost is given by  $c = .8x + 13.9$ .

a) Find the revenue equation.

b) What is the revenue from selling 5 million units?

c) What is the break-even point?

4) This example will help you do exercises 43-46 on p. 107.  
 Let the supply and demand for a certain commodity be given by:

$$\text{supply : } p = \frac{5}{4}q \text{ and demand: } p = 20 - \frac{3}{4}q$$

where  $p$  is in dollars.

- Find the price for a demand of 8 units.
- Find the demand for the commodity at a price of \$11.
- Find the supply when the price is \$15.
- Graph both equations on the same axes.
- Find the equilibrium demand.
- Find the equilibrium price.

### Section 2.5

1) This example will help you do exercises 57-62 on p. 125.

The cost to produce  $x$  kumquats is  $C = 60x + 450$ , while the revenue is  $R = 90x$ . Find all values of  $x$  so that the grower will at least break even.

### Section 6.1

1) This example will help you do exercises 1-2 on p. 319.

Determine whether  $(2, 1)$  is a solution of the system of equations:

$$2x - y = 3$$

$$x - 3y = 4$$

Examples 2-5 will help you do exercises 3-20 on p. 319.

$$2) \text{ Solve } \begin{cases} 2x + 3y = 8 \\ -2x + y = 0 \end{cases}$$

- a) by the graphing method    b) by the substitution method    c) by the elimination method

$$3) \text{ Solve } \begin{cases} 4x + 3y = 7 \\ 5x - 2y = 1 \end{cases} \text{ by elimination}$$

$$4) \text{ Solve } \begin{cases} x + y = 3 \\ 3x + 3y = 7 \end{cases}$$

$$5) \text{ Solve } \begin{cases} 2x - y = 1 \\ -4x + 2y = -2 \end{cases}$$

6) This example will help you do exercises 22-3 on p. 319.

$$\text{Solve } \begin{cases} -\frac{1}{3}x + \frac{2}{3}y = \frac{4}{3} \\ \frac{x}{2} + y = \frac{1}{3} \end{cases}$$



7) This example will help you do exercise 29 on p. 320.

Lisette has invested \$7200 in PECO and LEGO stock. The PECO stock currently sells for \$40 a share and the LEGO stock for \$10 a share. If PECO stock goes up 50% in value and LEGO stock doubles, her stock will be worth \$11,400. How many shares of each stock does she own?

8) This example will help you do exercise 30 on p. 320.

A souvenir store sells t-shirts for \$12 and baseball caps for \$15. Its entire stock is worth \$4200. If only half the shirts and one-third of the caps are sold, the resulting revenue is \$1800. How many t-shirts and caps are left in the store?

### Section 7.1

1) Write a system of inequalities that describes all the conditions and graph the feasible region of the system:

Carmella and Maria produce homemade rugs and afghans. They spin the yarn, dye it, and then weave it. A rug requires 3 hours of spinning, 1 hour of dyeing, and 10 hours of weaving. An afghan needs 3 hours of spinning, 3 hours of dyeing, and 3 hours of weaving. Together, they spend at most 12 hours per week spinning, 9 hours dyeing, and 30 hours weaving. Let  $x$  = the number of rugs produced per week and  $y$  = the number of afghans produced per week.

### Section 7.3

1) Mandy has just completed the study of linear programming and plans to use his knowledge in his personal investments. He plans to invest up to \$40,000 in either corporate or municipal bonds or both. The least he is allowed to invest in corporate bonds is \$6000 and he does not want to invest more than \$22,000 in corporate bonds. He does not want to invest more than \$30,000 in municipal bonds. The interest on corporate bonds is 8% and on municipal bonds is  $7\frac{1}{2}\%$ . This is simple interest for one year. How much should he invest in each type of bond in order to maximize his income? What is the maximum income?

2) Suppose it takes 12 units of carbohydrates and 8 units of protein to satisfy the minimum weekly requirements for a certain person. A certain meat contains 2 units of protein and 6 units of carbohydrates in each pound. A certain cheese contains 2 units of protein and 2 units of carbohydrates in each pound. The meat costs \$1.50 per pound and the cheese costs \$1 per pound. How many pounds of each are needed in order to minimize cost and still meet the minimum dietary requirements?

3) A farm consists of 240 acres of cropland. The farmer wishes to plant this acreage in corn or oats. Profit per acre in corn production is \$40 and that in oats is \$30. An additional restriction is that the total hours of labor during the production period cannot exceed 320. Each acre of land in corn production requires 2 hours of labor during the production period, whereas production of oats requires 1 hour per acre. Determine how the land should be divided between corn and oats in order to give maximum profit?



## Section 10.4

1) A small town has only two pizza parlors, Mario's and Giuseppe's. Mario's has begun an advertising campaign in an effort to increase its market share. After the ads run, a marketing firm finds that there is a probability of .9 that a Mario's customer will buy his next pizza from Mario's and a probability of .4 that a Giuseppe's customer will buy his next pizza from Mario's. Assume that the probability that a customer goes to a given pizza parlor depends only on where the previous pizza was purchased. Write the transition diagram and the transition matrix for this problem.

2) Decide which of the following could be a transition matrix. Sketch a transition diagram for any transition matrices.

a)  $\begin{bmatrix} 0 & .5 & .5 \\ .1 & .3 & .6 \end{bmatrix}$

b)  $\begin{bmatrix} \frac{1}{2} & \frac{1}{2} \\ -1 & \frac{5}{4} \\ \frac{1}{4} & \frac{1}{4} \end{bmatrix}$

c)  $\begin{bmatrix} 0 & 0 & 1 \\ .4 & .4 & .2 \\ .3 & .3 & .3 \end{bmatrix}$

d)  $\begin{bmatrix} \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \\ 0 & \frac{1}{2} & \frac{1}{2} \\ 1 & 0 & 0 \end{bmatrix}$

3) Referring to example 1, suppose that Mario's market share was 35% at the beginning of the ad campaign and Giuseppe's market share was 65%. Find the market share of each after:

- a) 1 pizza is purchased.
- b) 2 pizzas are purchased.
- c) 3 pizzas are purchased.
- d) What is the long-range prediction?

4) Find the equilibrium vector for the transition matrix:  $\begin{bmatrix} 1 & 5 \\ \frac{6}{1} & \frac{6}{1} \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix}$

5) A college has three groups of students: honor roll students ( $H$ ), regular students ( $R$ ), and those on academic probation ( $P$ ). Suppose that the probability that a student ends up in a particular group depends only on which group they were in the previous semester as follows:

|     | $H$  | $R$ | $P$ |
|-----|--|-----|-----|
| $H$ | $\begin{bmatrix} .5 & .4 & .1 \end{bmatrix}$ |     |     |
| $R$ | $\begin{bmatrix} .4 & .4 & .2 \end{bmatrix}$ |     |     |
| $P$ | $\begin{bmatrix} .1 & .3 & .6 \end{bmatrix}$ |     |     |

Suppose 10,000 students are in the regular group this semester. Determine how many of these 10,000 are in each group after:

- a) one semester.
- b) two semesters.