Errata List for the First and Second Printings of ***Discrete Mathematics and Its Applications 4/E***, by Kenneth H. Rosen.

The items that appear in boldface type are those which have been corrected in the third printing.

To determine which printing of the textbook you have, turn to the copyright page. There you will find a long list of numbers located directly under the statement: "This book is printed on acid free paper." If this list of numbers begins with the numeral one, you have purchased the first printing of the textbook. If this list of numbers begins with the numeral two, you have purchased the second printing of the textbook. The third printing of this textbook will incorporate all of the corrections listed on this errata sheet. The third printing will be available from the MHHE warehouse in the summer of 1999.

Errata list:

Page 18—Example 5

$\Leftrightarrow (\neg p \wedge \neg q) \vee \mathbf{F}$ from the **commutative** law for disjunction

Page 66—Example 23

Consequently, $\lfloor \mathbf{30{,}000{,}000/424} \rfloor = 70{,}754$ ATM cells can be transmitted in 1 minute over a 500 kilobit per second connection.

Page 68—Problem 32

32. Show that $\left\lceil x + \frac{1}{2} \right\rceil$ is the closest integer to the **number** x, except when x is midway between two integers, when it is the larger of these two integers.

Page 77—Example 17

$$d_i = \begin{cases} 4 & \text{if } d_{ii} \neq 4 \\ 5 & \text{if } d_{ii} = 4 \end{cases}$$

Page 78—Problem 6

f) the sequence whose nth term is the largest integer whose binary expansion (defined in Section **2.4**) has n bits. (Write your answer in decimal notation.)

Page 86—Theorem 2

Suppose that $f_1(x)$ is $O(g_1(x))$ and $f_2(x)$ is $O(g_2(x))$. Then $(f_1 + f_2)(x)$ is $\boldsymbol{O(\max(|g_1(x)|, |g_2(x)|))}$.

Page 145—Pierre de Fermat Biography

Fermat formulated what **was** the most famous unsolved problem in mathematics.

Page 171—Step 5
$\neg r \rightarrow s$ Hypothesis

Page 202—Recursively Defined Functions
2. Give a rule for finding its value **at** an integer from its value at smaller integers.

Page 273—James Bernoulli Biography
James Bernoulli is best known for the work *Ars* ***Conjectandi***, published 8 years after his death.

Page 353—Problem 59
a) Using Exercise 44 in the Supplementary Exercises of Chapter 4, show the probability generating function G_{X_m} is given by $G_{X_m}(x) = p^m/(1-qx)^m$, where $q = 1 - p$.

Page 410—Example 6
For instance, from Example 6 it follows that $[0]_4 = \{\ldots, -8, -4, 0, 4, 8, \ldots\}$ and $[1]_4 = \{\ldots, -7, -3, 1, 5, 9, \ldots\}$.

Page 495

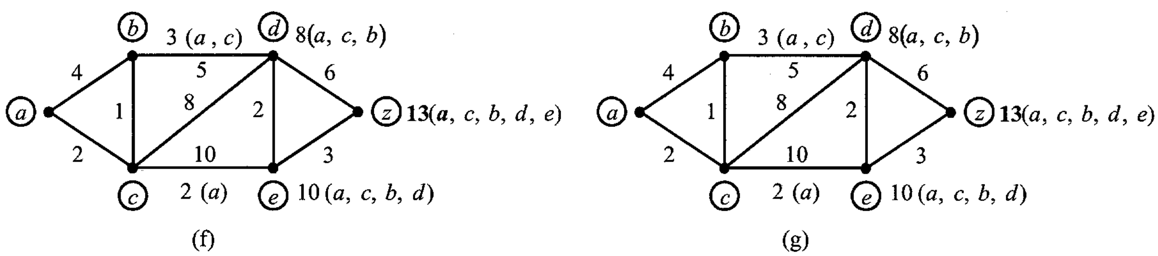

FIGURE 4 Using Dijkstra's Algorithm to Find the Shortest Path from *a* to *z*.

Page 512—Theorem 1
They showed that if the four color theorem were false, there would have to be a counterexample of one of approximately 2000 different types, **and they then showed that none of these types exist.**

Page 538—Theorem 5

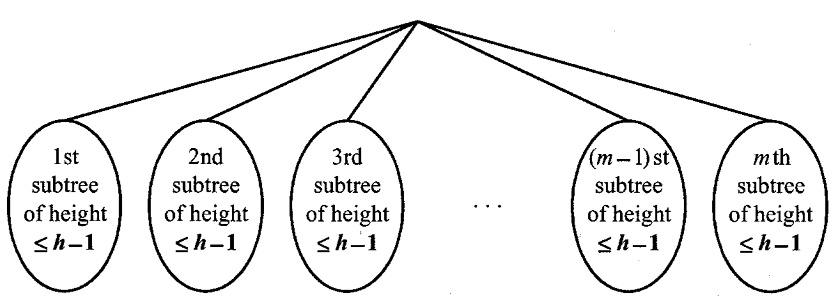

FIGURE 15 The Inductive Step of the Proof.

Page 545—2nd paragraph

One way to insure that no bit string corresponds to more than one sequence of letters, the bit string for a letter must never occur as the first part of the bit string for another letter.

Page 556—Example 5

For instance, **in order** transversals of the binary trees in Figure 11, which represent the expressions $(x+y)/(x+3)$, $(x+(y/x))+3$, and $x+(y/(x+3))$, all lead to the infix expression $x+y/x+3$.

Page 567—Example 4, 7th paragraph

Put the smaller of these two elements at the **left** end of L, and remove it from the list it was in.

Page 568—Algorithm 2

begin

remove smaller of first element of L_1 and L_2 from the list it is in and put it at the **left** end of L.

Page 597—Table 5

$\overline{(xy)} = \overline{x} + \overline{y}$ $\overline{(x+y)} = \overline{x}\,\overline{y}$	De Morgan's laws

Page 607—Figure 6

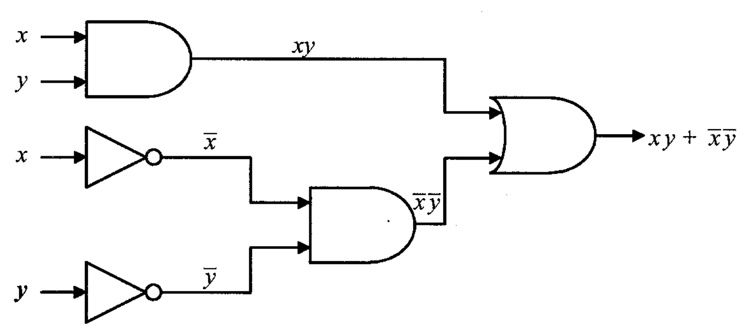

FIGURE 6 A Circuit for a Light Controlled by Two Switches.

Page 608—Figure 7

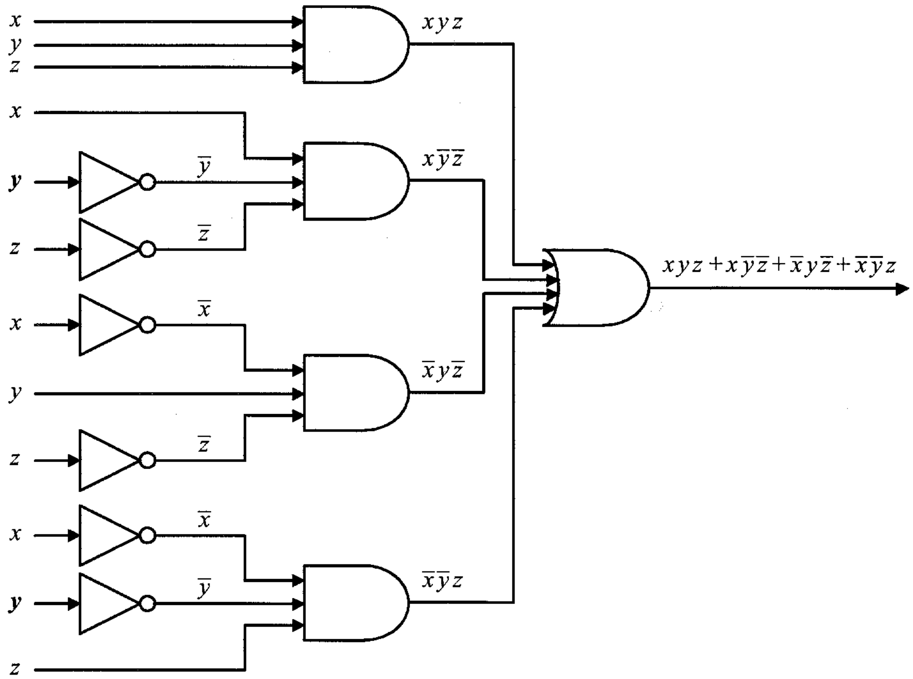

FIGURE 7 A Circuit for a Fixture Controlled by Three Switches.

Page 610—Figure 10

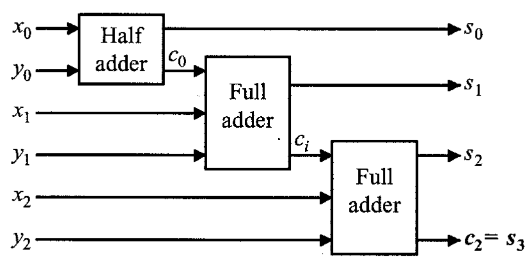

FIGURE 10 Adding Two Three-Bit Integers with Full and Half Adders.

Page 616

Solution: The Karnaugh maps for these expansions are shown in Figure 10. Using the blocks shown leads to the sum of products (a) $wyz + wx\bar{z} + w\bar{x}\bar{y} + \bar{w}\bar{x}y + \bar{w}x\bar{y}z$, (b) $\bar{y}\bar{z} + w\bar{x}y + \bar{x}\bar{z}$ and (c) $\bar{z} + \bar{w}x + w\bar{x}y$.

Page 617—Figure 10

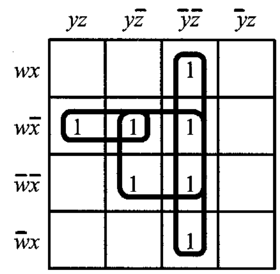

FIGURE 10 Using Karnaugh Maps in Four Variables.

Page 632—Example 1
Let $\boldsymbol{G} = (\boldsymbol{V}, \boldsymbol{T}, \boldsymbol{S}, \boldsymbol{P})$ where $V = \{a, b, A, B, S\}$, $T = \{a, b\}$, S is the start symbol, and $P = \{S \rightarrow ABa, A \rightarrow BB, B \rightarrow ab, AB \rightarrow b\}$. G is an example of a phrase-structure grammar.

Page 632—Example 2
DEFINITION 4. Let $\boldsymbol{G} = (\boldsymbol{V}, \boldsymbol{T}, \boldsymbol{S}, \boldsymbol{P})$ be a phrase-structure grammar. The *language generated by G* (or the *language of G*), denoted by $L(G)$, is the set of all strings of terminals that are derivable from the starting state *S*. In other words, $L(G) = \left\{w \in T^* | S \overset{*}{\Leftrightarrow} w\right\}$.

Page 662—Proof
The **grammar** $G = (V, T, S, P)$ is defined as follows.

Page 663—Solution
Solution: The grammar $G = (V, T, S, P)$ generates the set recognized by this automaton where $V = (S, A, B, 0, 1)$; where the symbols *S*, *A*, and *B* correspond to the states s_0, s_1 and s_2, respectively; $T = \{0, 1\}$; *S* is the start symbol; and the productions are $S \rightarrow 0A$, $S \rightarrow 1B$, $S \rightarrow 1$, $S \rightarrow \lambda$, $A \rightarrow 0A$, $A \rightarrow 1B$, $A \rightarrow 1$, $B \rightarrow 0A$, $B \rightarrow 1B$, and $B \rightarrow 1$.

Page 667—Figure 1
Only **finitely** many nonblank cells at any time.

Page 669—Example 2
Find a Turing machine that recognizes the set of bit strings which have a 1 as their second bit (that is, the regular set $\mathbf{(0 \cup 1)1(0 \cup 1)^*}$).

Page 670—Example 3
Solution:
We wish to recognize only **a subset** of strings in V^*.

Page S-6—Problem 15
n) $\exists x \exists y(x \neq y \wedge \forall z((z \neq x \wedge z \neq y) \rightarrow (M(x, z) \vee M(y, z) \vee T(x, z) \vee T(y, z))))$

Page S-27—Problem 57

On the other hand, if $\mu n - \lfloor \mu n \rfloor \geq \mathbf{1} - \mu$, then $\mu(n+1) \geq 1 + \lfloor \mu n \rfloor$, so $\lfloor \mu(n+1) \rfloor = \lfloor \mu n \rfloor + 1$, as desired.

Page S-31—Problem 29

f) **72, 043, 541, 640**

Page S-73—Problem 3

3. a)

	y	$\bar{y}$
x		1
$\bar{x}$		

b)

	y	$\bar{y}$
x	1	
$\bar{x}$		1

c)

	y	$\bar{y}$
x	1	1
$\bar{x}$	1	1

Page S-38

41. a) Using the formula for f_n, we see that

$$\left| f_n - \frac{1}{\sqrt{5}}\left(\frac{1+\sqrt{5}}{2}\right)^n \right| = \left| \frac{1}{\sqrt{5}}\left(\frac{1-\sqrt{5}}{2}\right)^n \right| < \frac{1}{\sqrt{5}} < \frac{1}{2}$$

Page S-81

c)