DISCRETE MATHEMATICS WITH APPLICATIONS, 3rd Edition
by Susanna S. Epp

Great effort was made to insure as error-free a product as possible. With approximately 3 million characters in the book, however, some mistakes are inevitable. I would be grateful to learn of any errors you find so that they can be listed on this page and corrected in subsequent printings. Please send them to me at sepp@condor.depaul.edu.

With thanks, Susanna S. Epp

Note: The printing number is located on the page on the opposite side from the title page. It is the smallest number listed underneath the words "Printed and bound in the United States of America."

ERRATA FOR THE 2nd PRINTING

CHAPTER 1

Text

LOCATION	CORRECTION
9 – line 2	Change "Construct a truth table for *P* with" to "Construct a truth table with".

Exercises

LOCATION	CORRECTION
A-9 – **1.2 #40a**	In line 2, there is a missing left square bracket; the left-most six symbols should be "≡ [~(~*p*".

CHAPTER 2

Exercises

LOCATION	CORRECTION
88 – Line 2 from bottom	Change "for the predicate variables" to "for the predicate symbols".
99 – Bottom of page	Change "quanified" to "quantified".
110 – **2.3 # 42**	Change "L" to "*f*(*a*)" three times. I.e., in line 2, change to "definition of $\lim_{x \to a} f(x) = f(a)$" and in line 5 change to "$f(a) - \varepsilon < f(x) < f(a) + \varepsilon$."
120 – Box at top of page	Change "$\forall x\, P(x) \to Q(x)$" and "$\forall x\, Q(x) \to R(x)$" and "$\forall x\, P(x) \to R(x)$" to "$\forall x\, (P(x) \to Q(x))$" "$\forall x\, (Q(x) \to R(x))$" and "$\forall x\, (P(x) \to R(x))$". Also in all three lines change "Anything that *x* makes" to "Any *x* that makes".
123 – Above #21	Change "Indicate whether the arguments in 21-26" to "Indicate whether the arguments in 21-27".
A-18 – **2.3 #51**	Change the answer for part (a) to "True. Circle *b* is the same color (black) as squares *h* and *j*."

CHAPTER 3

Text

LOCATION	CORRECTION
153 – Line 4	Change to "If $b \neq 0$, then you can cancel *b* from…."
156 – Line 4 from	Change "more than 4" to "4 or more".

bottom	
175 – Line 1	Change "*since a, b, c, and d are, and since*" to "*since a, b, c, and d are integers, and since*".

Exercises

LOCATION	CORRECTION
A19 – **3.1 #4**	In line 2, change "$m > 0$ and $n > 0$" to "$m > 1$ and $n > 1$".
A22 – **3.3 #35b**	Change "5.880^2" to "5880^2".
A-23 – Answer for **3.4 #29**	Change the last two lines to "$9q^2 + 12q + 4 = 3(3q^2 + 4q + 1) + 1$, and $3q^2 + 4q + 1$ is an integer because it is a sum of products of integers."
A-26 – **3.6 #28a**	In line 6, change "$\sqrt{ns} = \sqrt{n}\sqrt{n}$" to "$\sqrt{ns} > \sqrt{n}\sqrt{n}$".
A-26 – **3.6 #29a, b**	Change the third number in the list from "4" to "5".

CHAPTER 4

Text

LOCATION	CORRECTION
204 – Example 4.1.9(b)	Change the index of summation from "$i = 0$" to "$k = 0$".
232 – line 3 from bottom	Change "***for all integers n ≥ 1"*** to "***for all integers k ≥ 1".***
235 – line 4 from bottom	Change "if $P(k)$ is true then $P(k+1)$ is true" to "if $P(i)$ is true for all integers i with $a \le i < k$, then $P(k)$ is true".
238 – line 15 from bottom	Change "the sum of the factors in the left-hand product plus those" to "the sum of the number of factors in the left-hand product plus the number".

Exercises

LOCATION	CORRECTION
226 – **4.2 #5**, line 5	Change "n" to "n^2".
A-30 – **4.1 #66**	In the first row of the table, change "g" to "q".
A-30 – **4.2 #1**	In lines 3, 5, 7, 14, and 20, change "15" to "14", and change line 4 to "Fourteen cents can be obtained by using one 8-cent coin and two 3-cent coins."
A-32 – **4.2 #13**, last line	Change "$n \ge 0$" to "$n \ge 2$".
234 – 4.3 #33	The arrow from C to E should go in the opposite direction.
243 – **4.4** #**21**	Add *H* next to the exercise number.
A-35 – **4.4 #7**	In the bottom line, after "must show that" insert "$g_k =$".
A-37 – **4.4 #21**, lines 3 & 4	Delete the words "represent *r* as a quotient of integers".
A-37 – **4.4 #20**,line 9	Change "1 < *b* by 2*a* to obtain 2*a* < 2*ab* = *nb*. Thus *a* < 2*a* < *nb*" to "1 ≤ *b* by 2*a* to obtain 2*a* ≤ 2*ab* = *nb*. Thus *a* < 2*a* ≤ *nb*".
A-37 – **4.4** #**22**, line 2	Change "for some integer *i*" to "for some nonnegative integer *i*".

CHAPTER 6

Text

LOCATION	CORRECTION
316 – line 12	Change "direct use of the first version" to "direct use of the second version".
364 – line below the definition	Change the second sentence to "Defining it to be 1, as is done here, makes it possible to consider expressions such as $(a+b)^n$ without having to exclude values of the variables that result in the expression 0^0."

Exercises

LOCATION	CORRECTION

A-46 – **6.2 #12a**, line 3	Change "8" to "9".
A-46 – **6.2 #14b**	Change "17,576,000" to "1,757,600".
A-50 – **6.3 #26d**	Change "$N((T \cap N) - N(T \cap N \cap U))$" to "$N(T \cap N) - N(T \cap N \cap U)$".
347 – 6.4 #11i	Change to: "Neither a repeated denomination, nor five adjacent denominations, nor five of the same suit"
A-52 – **6.5 #3d**, line 5	Delete the word "random".
A-52 – **6.5 #18**	An alternative solution for this exercise is given at the end of these errata. (With thanks to David Little and Stephen Weissenhofer.)
A-54 – **6.7 #15**	Change "$\binom{15}{8}$" to "$\binom{15}{7}$" in each of the three places where it occurs.
A-56 – **6.9 #10a**	In line 7 change "$A \cap U_2$" to "$B \cap U_2$".
A-56 – **6.9 #10b**	Given that the chosen ball is blue, the probability that it came from the first urn is $P(U_1 \mid B)$. By Bayes' theorem and the computations in part (a), $$P(U_1\|B)=\frac{P(B\|U_1)P(U_1)}{P(B\|U_1)P(U_1)+P(B\|U_2)P(U_2)}=\frac{(12/19)(0.5)}{(12/19)(0.5)+(8/27)(0.5)}\cong 68.1\%.$$
A57 – 6.9 #29a	Change "$(0.3)^0$" to "$(0.03)^0$".

CHAPTER 7

Text

LOCATION	CORRECTION
394 – Example 7.1.6	In line 1 of the solution, change "-1^{n+1}" to "$(-1)^{n+1}$".
395 – Example 7.1.9	In line 1, change "$b \neq 0$" to "$b \neq 1$".

Exercises

LOCATION	CORRECTION
400 – **7.1 #11d**	Change "U_{kj} to "u_{kj} ".
454 – **7.5 #1**	In line 2, change "A are B" to "A and B".

CHAPTER 8

Text

LOCATION	CORRECTION
477 – Example 8.2.2	Change the statement to: "Under the force of gravity, an object falling in a vacuum falls about 9.8 meters per second (m/sec) faster each second than it fell the second before. Thus, neglecting air resistance, a skydiver's speed upon leaving an airplane is approximately 9.8 m/sec one second after departure, 9.8+9.8=19.6m/sec 2 seconds after departure, and so forth. If air resistance is neglected, how fast would the skydiver be falling 60 seconds after leaving the airplane?"
478 – Example 8.2.2	Change the solution to: "Let s_n be the skydiver's speed in m/sec n seconds after exiting the airplane if there were no air resistance. Thus s_0 is the initial speed, and since the diver would travel 9.8 m/sec faster each second than the second before, $s_k = s_{k-1} + 9.8$ m/sec for all integers k. It follows that $s_0, s_1, s_2, \ldots$ is an arithmetic sequence with a constant adder of 9.8, and thus $s_n = s_0 + (9.8)n$ for each integer n. Hence sixty seconds after exiting and neglecting air resistance, the skydiver would travel at a speed of $s_{60} = 0+(9.8)(60)=588$ m/sec."

Exercises

LOCATION	CORRECTION
A-71 – **8.2 #26b**	In line 3, change "$(1.0025)^{n-1}$" to "$(1.0025)^{n-2}$".

CHAPTER 9

Text

LOCATION	CORRECTION
551 – Example 9.4.5	In line 1 of the solution, change "$\Omega(x)$" to "$\Omega(x \log_2 x)$", and in line 9, change "$O(x)$" to "$O(x \log_2 x)$".
552 – Example 9.4.5	In line 5, change "$\Omega(x)$" to "$\Omega(x \log_2 x)$" and "$O(x)$" to "$O(x \log_2 x)$". In line 6, change "$\Theta(x)$" to "$\Theta(x \log_2 x)$".
559 – line 3	Change the square brackets to floor symbols.

Exercises

LOCATION	CORRECTION
519 –**Figure 9.2.1**	Change the captions to "$f(x)$ is $\Omega(g(x))$", "$f(x)$ is $O(g(x))$", and "$f(x)$) is $\Theta(g(x))$", respectively

CHAPTER 10

Text

LOCATION	CORRECTION
591 – bottom line	Change "For all $m,n \in \mathbf{Z}$" to "For all $m,n,p \in \mathbf{Z}$".
592 – line 2	Change "For all $m,n \in \mathbf{Z}$" to "For all $m,n,p \in \mathbf{Z}$".
595 – Figure 10.3.1	Change "$A_i \cap A_j = \varnothing$" to "$A_i \cap A_j = \varnothing$".
606 – lines 4-6	Change the first sentence to "In exercise 36 at the end of this section, you are asked to show that if *a* is any element of an equivalence class [*b*], then [*a*] = [*b*]."

Exercises

LOCATION	CORRECTION
623 – line 13	Change "27-(-13) = -40 = (-1)40" to "27-(-13) = 40".

CHAPTER 11

Text

LOCATION	CORRECTION
657 – Definition of subgraph	Change "every edge in *H* has the same endpoints as in *G*" to "the endpoints of the edges in *H* are in *V*(*H*)".
691 – line 5 from bottom	Add an equal sign between the second and third matrices.
702 – line 18	Change "the ones that are images under *g*" to "the ones that are images under *h*".
715 – Boxed text, line 7	Change "vertices *v* and *w*" to "distinct vertices *v* and *w*".
730 – line 6 from bottom	Change "first" to "last".
730 – line 4 from bottom	Change "*T*" to "*W*".
730 – line 2 from bottom	Change "an edge *e'* joining" to "an edge *e'* that is not in *T* and joins".

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Alternative Solutions for Exercise 6.5 #18 (with thanks to David Little and Stephen Weissenhofer.)

6.5 #18(a): Let P be the set containing all selections of 20 pastries chosen from the six kinds. From exercise 3(a) we know that $N(P) = 53,130$. Let E be the set of all the selections that contain at least 11 eclairs. For these selections, 9 additional pastries are chosen from the 20 kinds, and so $N(E) = \binom{9+6-1}{9} = \binom{14}{9} = 2,002$. But $P-E$ is the set of all the selections that contain at most 10 eclairs, and, by the difference rule, $N(P-E) = N(P)-N(E) = 53,130-2,002 = 51,128$. Thus there are 51,128 selections of pastries that contain at most 10 eclairs.

6.5 #18(b): Let S be the set of all the selections of 20 pastries that contain at least 9 napolean slices. For these selections, 11 additional pastries are chosen from the 20 kinds. So $N(S) = \binom{11+6-1}{11} = \binom{16}{9} = 4,368$. Now $E \cap S$ is the set of all the selections that contain at least 11 eclairs and at least 9 napolean slices. Since $11+9 = 20$, there is only one such selection, and so $N(E \cap S) = 1$. By the inclusion/exclusion principle,

$$N(E \cup S) = N(E) + N(S) - N(E \cap S) = 2,002 + 4,368 - 1 = 6,369.$$

But $E \cup S$ is the set of all the selections that contain at least 11 eclairs or at least 9 napolean slices, and so $P - E \cup S = (P - E) \cap (P - S)$ is the set of all the selections that contain at most 10 eclairs and at most 8 napolean slices. By the difference rule,

$$N(P - E \cup S) = N(P) - N(E \cup S) = 53,130 - 6,369 = 46,761.$$

Thus there are $46,761$ selections of pastries that contain at most 10 eclairs and at most 8 napolean slices.