Student Solutions Manual and Study Guide for
Discrete Mathematics with Applications, 3rd Edition
by Susanna S. Epp

ERRATA

LOCATION	CORRECTION
1 – 1.1 #15	The heading for the sixth column should be "$\sim(p \wedge q) \vee (p \vee q)$."
5 – 1.3 #9	Line 1: In column 7, change T to F and delete that row 1 is critical. Line 2: In column 7, change F to T and add that row 2 is critical. Row 4 is also critical. The first words of the explanation should say: "Row 3 of the truth table shows…"
13 – Answers #15	Change to "$p \wedge \sim q$
15 – 2.1 #18d	Change "$\exists x$" to "$\exists s$".
26 – 3.3 #9	Should be: "Yes, because $2a \cdot 34b = 4(17ab)$ and $17ab$ is an integer since a and b are integers and products of integers are integers."
28 – 3.4 #18	Line 2: Equation should be "$96m + 36 + 4 = 12(8m + 3) + 4$".
39 – Review #18	Change "there exists" to "there exist".
43 – 4.1 #6	Line 1: Change "$f_3 = \lfloor 3/4 \rfloor \cdot 4 = 0 \cdot 4 = 4$" to "$f_3 = \lfloor 3/4 \rfloor \cdot 4 = 0 \cdot 4 = 0$".
44 – 4.1 #15	In line 1, change the formula to "$a_n = (-1)^{n-1} (n-1/n)$", and in line 2 change the formula to "$a_n = (-1)^n (n/n+1)$"
51 – 4.4 #21	This solution is missing. It is given below this table.
52 – 4.4 #24	Last line: Change "these two" to "these three".
65 – 5.3 #39d	Change line 2 to "$\{1, 2, 5, 6\} = \{1,2\} \cup \{7, 8\} = \{1, 2, 7, 8\}$".
72 – 6.1 #33	In line 10, change "$m - (k+1) + 1$" to "$(k+1) - m + 1$".
72 – 6.2 #12b	Line 5: Change "Step 6 is to choose the first…" to "Step 6 is to choose the last…". Line 6: Change "2 through (which equals 14) There are 14 – 2 +1 = 11…" to "2 through E (which equals 14). There are 14 – 2 +1 = 13…". Line 7: Change "$10 \cdot 16 \cdot 16 \cdot 16 \cdot 11 = 450{,}560$" to "$10 \cdot 16 \cdot 16 \cdot 16 \cdot 16 \cdot 13 = 8{,}519{,}680$".
79 – 6.7 #9	Change all eight minus signs to plus signs.
80 – 6.7 #18	Line 1: Change "$a = 5$ and $b = -1$" to "$a = 1$ and $b = 2$".
83 – 6.9 #3b	Line 3: Change "Then the probability" to "The event".
83 – 6.9 #6c	Line 3: Change "42.8%" to "42.9%".
85 – 6.9 #24b	Assuming that the manuscript contains 1000 typographical errors, the expected number of missed errors is $(1000) \cdot (0.018) = 18$.
86 – 6.9 #30d(i)	Change "4.88%" to "0.488%".
96 – 7.3 #21	Add the word "dividing" in the second sentence. So the second sentence should begin "The reason is that in the long-division process of dividing 5.0000… by 20483,…"
119 – 8.4 #27	Last line on the page: Change to "Hence $M(k) = 91$ *[as was to be*

	shown]."
131 – 9.3 #3b	Change the equation to "$(8cm^3)/cm^3 = 8$".
135 – 9.5 #15	Line 4: Change "Then" to "Then all quantities are positive, and so".
149 – 10.4 #33	Line 2: Change "*as* + *bt* = 1" to "there exist integers *s* and *t* such that *as* + *bt* = 1".
160 – 11.1 #24c	Top line of pictures, second from left: Add an edge from v_1 to v_3. Top line of pictures, third from left: Add an edge from v_2 to v_3.
176 – 12.1 #9	Add a right parenthesis at the end of this expression.

Solution for Section 4.4, exercise 21

Proof 1: Let r be any rational number. *[We must show that there exists an integer m such that $m \le r < m+1$.]*

Case 1 (r is an integer): In this case $r \le r < r+1$, and so there exists an integer m (namely r) such that $m \le r < m+1$

Case 2 (r is not an integer and $r > 0$): In this case let S be the set of all integers n such that $r < n$. That is, $S = \{n \in \mathbf{Z} \mid r < n\}$. By the result of exercise 20, there is some integer that is greater than r, and so S has one or more elements. Also, because $r > 0$, every element of S is greater than 0 (by the transitive property of order). Therefore, by the well-ordering principle for the integers, S has a least element. Call it k. Then $k-1$ is not in S, and so $k-1 \le r < k$. Let $m = k-1$. Then $m \le r < m+1$.

Case 3 (r is not an integer and $r < 0$): In this case $-r > 0$, and so, by case 2, there exists an integer $k-1$ such that $k-1 \le -r < k$. Multiply all parts of this inequality by -1 to obtain $-(k-1) \ge r > -k$, or, equivalently, $-k < r \le -k+1$. Because r is not an integer, $r \ne -k+1$, and so $-k < r < -k+1$. Let $m = -k$. Then $m \le r < m+1$.

Hence in all three cases there exists an integer m such that $m \le r < m+1$ *[as was to be shown]*.

Proof 2: Let r be any rational number. *[We must show that there exists an integer m such that $m \le r < m+1$.]* Let S be the set of all integers n such that $r < n$. That is, $S = \{n \in \mathbf{Z} \mid r < n\}$. By the result of exercise 20, there is some integer that is greater than r, and so S has one or more elements. Also, every element of S is greater than some integer. The reason is that because $-r$ is also rational, the result of exercise 20 implies that there is an integer t such that $-r < t$. Multiplying both sides of this inequality by -1 gives that $r > -t$, and thus that there is an integer, $-t$, that is less than r. Hence, by the transitive property of order, every element of S is greater than the integer $-t$. It follows by the well-ordering principle for the integers that S has a least element. Call it k. Then $k-1$ is not in S, and so $k-1 \le r < k$. Let $m = k-1$. Then $m \le r < m+1$ *[as was to be shown]*.