A Spiral Workbook for Discrete Mathematics
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Errata and Addenda (May-11-2018)

1. Page 29: the truth table in Example 2.5.2 should look like

p	q	$p \Rightarrow q$	$\overline{q}$	$\overline{p}$	$\overline{q} \Rightarrow \overline{p}$	$(p \Rightarrow q) \Leftrightarrow (\overline{q} \Rightarrow \overline{p})$
T	T	T	F	F	T	T
T	F	F	T	F	F	T
F	T	T	F	T	T	T
F	F	T	T	T	T	T

2. Page 30: on the bottom row of the second truth table in Example 2.5.5, the truth value under the $q \vee r$ column should be F (instead of T).

3. Page 46: in Hands-On Exercise 3.1.6, the range of x-values should be between $-\pi$ and 0.

4. Page 55: in the solution of Example 3.3.9, change all the occurrences of "2 divides ... ;" or "... is divisible by 2" to "... is a multiple of 2."

5. Page 81: change the title of Section 4.1 to "An Introduction to Sets."

6. Page 109: on the second line before Example 4.5.1, the intersection $\bigcap_{i=1}^{n} A_n$ should be $\bigcap_{i=1}^{n} A_i$.

7. Page 113: in Hands-On Exercise 4.5.7, on the last line, the intersection $\bigcap_{i \in I}$ should be $\bigcap_{i \in I} A_i$.

8. Page 117: in Theorem 5.1.1, insert S after the word "subset."

9. Page 118: at the end of Example 5.1.2, add the following remark.

   Remark. In the last example, we can also use contradiction to prove that the open interval $(0,1)$ does not have a smallest element. Suppose, on the contrary, the interval $(0,1)$ has a smallest element x. Then $0 < x < 1$. But we also have
   $$0 < \frac{x}{2} < x < 1.$$
   The number $\frac{x}{2}$ is also inside the interval $(0,1)$, but is smaller than x. This contradicts the assumption that x is *the* smallest element in the interval $(0,1)$. This contradiction proves that the interval $(0,1)$ does not have a smallest element. $\diamondsuit$

10. Page 122: change parts (b)–(d) of Example 5.2.2 to the following:

    (b) (-14) div $4 = -4$, and (-14) mod $4 = 2$.
    (c) (-17) div $(-3) = 6$, and (-17) mod $(-3) = 1$.
    (d) 17 div $(-3) = -5$, and 17 mod $(-3) = 2$.

11. Page 134: The value of r_3 in the table should be 66 (instead of 60).

12. Page 150: at the end of line -6 of Example 5.7.6: change "$9 = -2$" to "$9 \equiv -2$."

13. Page 153: in the last line of Example 5.7.9, change 26 to 27.

14. Page 162: in Example 6.2.6, before the phrase "For brevity, we shall write", add the sentence

    "Consequently, we can write
    $$f(x) = (3x) \bmod 5.$$
    Note that mod is a binary operation, hence we do not need to (and should not) enclose "mod 5" within a pair of parentheses. Alternatively, it may be easier to use congruence to define f."

15. Page 178: at the end of the remark after Theorem 6.5.1, $z \in s$ should be $z \in S$.
16. Page 192: on line 4 of Case 1, change xs to x-values.
17. Page 192: in Hands-On Exercise 6.7.4, the composite function it asks you to find should be $g \circ f$.
18. Page 193: delete the extra) on line 5 of Example 6.7.5.
19. Page 194: After the end of Example 6.7.5, add the following remark.

    Remark. Some may regard the definition of $g \circ f$ in the last example a bit confusing, but it is an acceptable and commonly used practice. Recall that we can define the functions f and g in the last example with the mod operation:

    $$\begin{aligned} f(x) &= (3x+5) \bmod 23, \\ g(x) &= (2x+1) \bmod 32. \end{aligned}$$

    However, care must be taken to describe the composite function:

    $$\begin{aligned} (g \circ f)(x) &= g(f(x)) \\ &= \big(2f(x)+1\big) \bmod 32 \\ &= \big(2[(3x+5) \bmod 23]+1\big) \bmod 32. \end{aligned}$$

    This definition is more complex, but it reflects more accurately how the images should be obtained. This example illustrates a dilemma in choosing the right notation: sometimes an exact notation could be cumbersome to use, so we often opt for a more convenient (although somewhat imprecise) notation. $\diamondsuit$

20. Page 198, Hands-On Exercise 7.1.4: the set B should be $\{1, 2, 3, ..., 12\} - \{7\}$.
21. Page 199, line 2: Likewise, 1, 5, and 11 are never used as . . . .
22. Page 213: On the second line of Example 7.3.10: replace the second occurrence of $(4, 4)$ with $(4, 5)$.
23. Page 216: on the first line of Example 7.4.1, the set R should be $\mathbb{R}$.
24. Page 224: in Theorem 8.2.4, the left-hand side of the equation should be $|A \cup B \cup C|$.
25. Page 245: in the last three equations in Example 8.5.2, the left-hand sides should be $(x - y)^4$.
26. Page 270: replace the last sentence in the answer to Problem 4 (Section 6.6) with

    "Therefore, $h^{-1}\colon \mathbb{Z}_{57} \to \mathbb{Z}_{57}$ is defined by

    $$h^{-1}(x) \equiv 7(x+3) \pmod{57}.$$

    Alternatively, we can also write $h^{-1}(x) = 7(x + 3) \bmod 57$."

27. Page 271, at the end of the last line: $\ldots = B - \{1, 5, 11\}$.