Errata

Mathematics: A Discrete Introduction, second edition

This is a list of errors found in *Mathematics: A Discrete Introduction*, 2nd edition, by Edward Scheinerman (Brooks/Cole © 2006). If you find errors, please report them to me at `ers@jhu.edu`. Thank you.

- Page xx, dependence diagram. The diagram shows that §28 depends on §25, but it does not. However, §28 does depend on §23. [Benjamin Pierce]
- Pages 42–43: No discussion of lists of length zero is presented and it would be appropriate to include an explanation of the value of $(n)_0$. [Collette Coullard]
- Page 54, paragraph following Proposition 9.5. The sentence "Proposition 9.5 asserts that $T \subseteq P$, which implies $(5,12,13) \in T$." should end "...implies $(5,12,13) \in P$." [Benjamin Pierce]
- Page 78, second displayed equation (last line of the proof of Proposition 12.1). The right-hand side reads 2^n but it should be $2^n - 1$. [Benjamin Yospe]
- Page 79, chart. The last two sequences in the first part of the first row of the chart (just before the gap in the first line) are both the same: 21534. They should be 21534 and then 21543. [Agustin Torres]
- Page 79, chart. In the first line of the chart, the second and fourth entries after the gap both read 23154. The latter one should read 23451. [Yan Jiao]
- Page 87, exercise 13.2. The phrase "provided their difference is 2 or smaller" is less ambiguously written "provided the absolute value of their difference is 2 or smaller." [Fred Torcaso]
- Page 133, Self Test problem 9: The problem is correct but the answer in the back of the book is wrong. Please see the entry for the solution to this problem on page 518 below.
- Page 214, sentence before Proposition 25.9: Insert "nonzero" before "rational number." [Kevin Byrnes]
- Page 224, first displayed equation: This should end $(1,4) \circ (4,5) \circ (5,3)$ (i.e., insert the composition $\circ$ symbol twice). [Kevin Byrnes]
- Page 311, last line. Change $a = b + x$ to $a = b \oplus x$. [Kevin Byrnes]
- Page 517, solution to Self Test problem 6. The answer reads $10!2^1 0$ but it should be $10!2^{10}$. [Pam Howard]
- Page 133, Self Test problem 10: Note that the sample two-word anagram is incorrect because the letter I appears only once but ought to appear twice. The solution to this problem is also incorrect (see the entry for the solution to this problem on page 518 below). [Chris Czyzewicz]
- Page 154, exercise 20.7. The second paragraph of the "proof" ends "So $x \neq 3$." However, this should read "So $x \neq 0$." This typo is the not the error that students are supposed to find. [Glen Granzow]
- Page 162, second displayed equation. This currently reads

$$\begin{aligned} 10^0 + 10^1 + \cdots + 10^k + 10^{k+1} &< 10^{k+1} + 10^{k+1} \\ &= 2 \cdot 10^k < 10 \cdot 10^k = 10^{k+1}. \end{aligned}$$

  However, the second line should be $= 2 \cdot 10^{k+1} < 10 \cdot 10^{k+1} = 10^{k+2}$. [Laura Beaulieu]

- Page 165, Proposition 21.11. The statement begins "Let $n \in \mathbb{Z} \ldots$" but it should begin "Let $n \in \mathbb{N} \ldots$" [Kevin Byrnes]
- Page 166, Proof of Proposition 21.11, first sentence of the basis case. The text reads "reduces to $\binom{0}{0} = 1 = F_1$" but it should be "reduces to $\binom{0}{0} = 1 = F_0$." [Franz Niederl]
- Page 173, second line. This line ends $16a_0 + 21$ but it should end $8a_0 + 21$. [Franz Niederl]
- Page 188, Exercise 22.1, part (l): The initial condition a_3 looks out of place. The solution given in the solutions manual does not match the given intial conditions. The solutions manual gives a value of a_9 that doesn't agree with the formula for a_n. However, if instead of specifying $a_3 = 6$ we instead specify $a_1 = 6$, then the value for a_9 given in the solutions manual is correct, but the formula given for a_n is still wrong. [Eric Harley]
- Page 288, Exercise 33.11, the last line: Replace $E(X)$ with $E(I_A)$. [Benjamin Pierce]
- Page 289, Chapter 6 Self Test problem 2. Replace "snuggly" with the properly spelled "snugly". [Benjamin Pierce]
- Page 298, Exercise 34.9. In this problem, we define the degree of the zero polynomial to be -1. This ought to be defined as $-\infty$. This change has no bearing on the exercise, but it prevents 0 from being an exception to the rule that for polynomials $p(x)$ and $q(x)$ we have $\deg[p(x)q(x)] = \deg p(x) + \deg q(x)$. [Otis Kenny]
- Page 308, Exercises 35.14 and 35.15. Although the statements are correct, it is probably wise to replace the hypothesis $n > 0$ with $n > 1$ in both problems. The case $n = 1$ is a bit unusual and not the main point of the problems. [Fred Torcaso]
- Page 398, Exercise 46.12. The parenthetical comment says that there are exactly two vertices of odd degree in the graph in Example 46.2. However, there are four such vertices. [Woojung Park]
- Page 414, third paragraph after Definition 49.3. This sentence asserts that K_1 is the "simplest tree possible" but, in fact, the empty graph satisfied the definition of tree and is arguably simpler than K_1. [Benjamin Pierce]
- Page 419, proof of Theorem 49.11. The direction arrows $\Rightarrow$ and $\Leftarrow$ do not correspond to the statement of the theorem. [Benjamin Pierce]
- Page 420, Exercise 49.12. Change "add the edge e to T" to "add the edge uv to T". [Glen Granzow]
- Page 421, Exercise 49.13. The empty graph is a counterexample to the problem as stated. The hypothesis should require the graph to have at least one vertex. [Samuel Eisenberg]
- Page 445, Exercise 52.9(a): In the parenthetical remark, the word "may" should be strengthened to "should" as the statement is false for trees with 5 or fewer vertices. [Glen Granzow]
- Page 447, Chapter 9 Self Test, problem 18(a). The first inequality should be reversed, that is: replace $\chi(G) \geq k$ with $\chi(G) \leq k$. This error can also be found (twice) in the solution on pages 538–539. [Glen Granzow]
- Page 482, Exercise 58.5: This exercise requests a one word modification of a false sentence into a true one (and not, by inserting "not" at the beginning). However, since the empty set is technically a lattice, it takes the insertion of two words to repair the statement. [Danny Puller]

- Page 518, solution to Chapter 3 Self Test question 9: The answer given is incorrect and the explanation is, of course, faulty. Here is the correct answer and explanation.

  There are $10! \cdot 2^{10}/10$ ways to seat the married couples. There are $10! \cdot 2^{10}$ ways for the couples to line up the couples so that husband and wife are next to each other (see Problem 6 from Self Test 2 on page 81). From this line up, they file into the room and seat themselves around the table (say, in clockwise order). Declare two of the line ups to be equivalent if they result in the same seating arrangement. Notice that if the married couple at the head of the line move to the back of the line (but stay in the same relative position to each other, either husband-wife or wife-husband) then the same seating arrangement results. Thus, each equivalence class contains 10 line ups. Therefore there are $10! \cdot 2^{10} \div 10$ different ways to seat the couples. [Michael DeLong]
- Page 518, solution to Chapter 3 Self Test question 10: The solution is incorrect because it fails to notice that I appears twice in ELECTRICITY. The correct answer is $10 \cdot 11!/16$. [Chris Czyzewicz]
- Page 519, solution to Chapter 3 Self Test question 14: The answer given is correct, but is not exactly the expression one would obtain by substituting $n = 50$ and $y = 2$ into Theorem 16.8 (Binomial Theorem) on page 108; that would give $\binom{50}{33}2^{33}$. Of course, this is equal to the answer given: $\binom{50}{17}2^{33}$. Students might be confused to see this other version. [Chris Czyzewicz]
- Pages 538–539, solution to Chapter 9 Self Test question 18(a): Replace $\chi(G) \geq k$ with $\chi(G) \leq k$. This error appears twice. [Glen Granzow]
- Page 524, solution to Chapter 5 Self Test question 6: The second proof asserts that $x^2 + xy + y^2$ can never equal zero. This is false as we may take $x = y = 0$. The proof can be easily repaired to show that if $x^2 + xy + y^2 = 0$ for integers x, y then $x = y = 0$. Since the overall goal here is to show that $x = y$, the result follows. [Glen Granzow]
- Page 553, second bullet under **Ordering**: The case "if $a < b$ and $c \leq d$ then $a + c < b + d$" is missing. A sensible way to rework this is to present the standard ordered field axioms:
  - $\forall a, b, c \in \mathbb{R}$, if $a \leq b$, then $a + c \leq b + c$.
  - $\forall a, b \in \mathbb{R}$, if $0 \leq a$ and $0 \leq b$, then $0 \leq ab$.

  From these follow the various standard algebraic properties of $<$, $\leq$, $>$, and $\geq$. [Benjamin Pierce]

Errors in the *Instructor's Manual*

- Page 72, solution to Exercise 22.1(l). See the comment to page 188 of the text. [Eric Harley]
- Page 111, solution to Exercise 33.11. In the first line of the displayed equation, the last term is $1 \times P(X = 1)$ but it should be $1 \times P(I_A = 1)$.
- Page 159, solution to Exercise 46.18(e). Change $4 \mapsto d$ to $4 \mapsto e$. [Benjamin Pierce]
- Page 165, solution to Exercise 49.1. The last word should be "cycle," not "tree." [Marie Jameson]
- Page 168, solution to Exercise 49.12. In the last sentence, "edges" should be "edge". [Glen Granzow]

- Page 172, solution to Exercise 51.9. In the second line, “Property” should be “Properly”. [Glen Granzow]
- Page 174, solution to Exercise 51.13(b). First, there is a confusion between the a and b vertices; in the opening paragraph the “outer rim” vertices are named $b_1, \ldots, b_5$, but later they are called $a_1, \ldots, a_5$. Second, in the first set of displayed equations defining the values of $f(a_i)$ we see $f(a_4) = 1$, but this should be $f(a_4) = 2$. [Glen Granzow]
- Page 176, solution to Exercise 52.9(b). The proof given is valid only in the case that the graph has at least one cycle. In case the graph is acyclic, it is easy to prove that $\delta(G) < 2$, but that needs to be added to the solution. [Donniell Fishkind]

Thanks to Glen Granzow and Carol Wood who pointed out some errors in this list of errors (they have been fixed).

The latest version of this document can be found online at this URL:

`http://www.ams.jhu.edu/~ers/mdi/typos/typos.pdf`

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