Errata for
Abstract Algebra: An Inquiry-Based Approach

Jonathan K. Hodge, Steven Schlicker, and Ted Sundstrom

May 9, 2019

- In **Investigation 5**, the references to Activity 5.11 on p. 53 should be to Activity 5.13 instead.
- **Investigation 5, Exercise 11 (p. 59)** should start with "Let a and b be integers."
- In **Definition 8.3 (p. 94)**, the fourth line should begin "Furthermore, for every integer $n \geq 2 \ldots$" (Currently, it reads "for every integer $n > 2$.")
- In the proof of **Theorem 13.5 (p. 169)**, the first line should read "Let F be a field..." (Currently, F is only assumed to be a commutative ring.)
- The parenthetical remark on **line 2 of p. 188** should note that $f(x)$ is a degree 3 polynomial (not degree 2 as stated).
- **Exercise 5 in Investigation 17 (p. 248)** is incorrect. The exercise asks to show that the ring $\mathcal{C}(\mathbb{R})$ (from Activity 17.27) is an integral domain. However, $\mathcal{C}(\mathbb{R})$ is not an integral domain. To see this, let f and g be defined by

  $$f(x) = \begin{cases} x, & \text{if } x \leq 0 \\ 0, & \text{if } x > 0 \end{cases} \quad \text{and} \quad g(x) = \begin{cases} 0, & \text{if } x \leq 0 \\ x, & \text{if } x > 0 \end{cases}.$$

  Then $f(x)g(x) = 0$ for all $x \in \mathbb{R}$, which makes $fg = 0$, but $f \neq 0$ and $g \neq 0$. So $\mathcal{C}(\mathbb{R})$ is not an integral domain.
- In **Preview Activity 19.1 (p. 271)**, the curve should be $r = \cos(2\theta)$.
- In **Activity 20.18 (p. 290)**, part (a)(ii) should begin, "Use part (i) to deduce that ..."
- In **Preview Activity 21.1 (p. 295)**, the second matrix listed for $\mathrm{GL}_2(\mathbb{R})$ is not invertible and is therefore not an element of $\mathrm{GL}_2(\mathbb{R})$. Replace any of the 1s with a 0 to obtain an invertible matrix.
- In the discussion at the top of **p. 296**, the permutation on the left-hand side of the equal sign should be

  $$\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 3 & 4 & 1 \end{pmatrix},$$

  not

  $$\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 3 & 2 & 1 \end{pmatrix}.$$
- In **Preview Activity 25.1 (p. 333)**, subparts (ii) and (iii) of part (b) should reference part (i) and not part (a).
- The last sentence on **p. 338**, as well as **Exercise 6 of Investigation 25 (p. 343)**, should note that S_n is never an Abelian group for $n \geq 3$. (Clearly, S_2 is Abelian.)
- In the proof of **Theorem 31.13 (p. 441)**, the third line from the top is missing a few words. It should read, "whenever $q_1, q_2, \ldots, q_t$ are the distinct prime factors of *the order of* an element $g \in G \ldots$" In addition, three lines above equation (31.11), the variable n is undefined. It should be replaced with $|a|$.

- On **p. 451**, the sentence above equation (32.2) is missing an important detail: $\mathrm{cl}(a_1), \mathrm{cl}(a_2), \ldots, \mathrm{cl}(a_r)$ are the distinct *multi-element* conjugacy classes of G.
- On **p. 454**, the following sentence is incorrect: "From Exercise 36 of Investigation 27 (see page 378), we know that the only normal subgroups of D_6 are $\{I\}$, $\langle R^3 \rangle$, and D_6." In fact, the normal subgroups of D_6 are the subgroups of $\langle R \rangle$ along with $\langle r, R^2 \rangle$ and $\langle rR, R^2 \rangle$.
- In **Activity A.12 (p. 541)**, the compositions are in the wrong order. All of the compositions should be $h \circ f$ or $h \circ g$.
- There are several typos in **Exercise 5 of Appendix A (p. 548)**. The corrected exercise is as follows:

  Suppose $f : A \to B$ and $g : B \to C$ are functions.

  (a) Is it true that if $g \circ f$ is an injection, then both f and g are injections? If the answer is no, are there any conditions that f or g must satisfy if $g \circ f$ an injection? Prove your answers.

  (b) Is it true that if $g \circ f$ is a surjection, then both f and g are surjections? If the answer is no, are there any conditions that f or g must satisfy if $g \circ f$ a surjection? Prove your answers.