Corrections to *Reading, Writing, and Proving*
by Ulrich Daepp and Pamela Gorkin

Chapter 3: Before doing Exercise 3.4, it would be a good idea to do an exercise with words.

Suggestion: If the sky is green, then $2 + 2 = 4$.
State the converse and the contrapositive.
Is the statement true?
Is the converse true?
Is the contrapositive true?

p. 37, Problem 3.7 part (d): Change to "Find the negation of the *original* statement by writing the sentence in symbols, negating it, and then rewriting the sentence in words."

p. 47, Problem 4.5: Change the last sentence to "State the universe, if appropriate."

Chapter 5: Include a discussion of proofs using "if and only if" before assigning problem 5.9.

Chapter 5, suggestion: Students are familiar with proofs in cases for things like $\frac{2x+1}{x-1} \leq 1$ iff $-2 \leq x \leq 1$. This might be a useful example for them.

Chapter 7: Before assigning problems, students should be able to work the following: If $A \subseteq B$ and $B \subseteq C$, then $A \subseteq C$.

p. 93 Exercise 8.9: Assume the index set is nonempty.

Suggestion for additional problems in Chapter 8:

Problem. If I is an index set and $\{A_\alpha\}_{\alpha \in I}$, $\{B_\alpha\}_{\alpha \in I}$ are such that $A_\alpha \subseteq B_\alpha$, then $\cup_{\alpha \in I} A_\alpha \subseteq \cup_{\alpha \in I} B_\alpha$.

Problem. If I and J are index sets with $J \subseteq I$ and $\{A_\alpha\}_{\alpha \in I}$ is a family of sets, prove that

$$\cup_{\alpha \in J} A_\alpha \subseteq \cup_{\alpha \in I} A_\alpha.$$

Chapter 9: At the very beginning, we should have pointed out more clearly that $A \in \mathcal{P}(S)$ if and only if $A \subseteq S$.

Here's a good problem to see if they understand the notation:

Problem: Let A be a set. Which of the following are true?

1. $A \in \mathcal{P}(A)$;
2. $\emptyset \subseteq \mathcal{P}(A)$;
3. $\emptyset = \mathcal{P}(\emptyset)$;
4. $\{\emptyset\} = \mathcal{P}(\emptyset)$.

p. 104 Problem 9.2 should say: Show that $\mathcal{P}(A) \cup \mathcal{P}(B) \neq \mathcal{P}(A \cup B)$ *in general*, by exhibiting . . ..

p. 106 This quote is often attributed to Mark Twain, but it is not clear whether or not he was the original author. It is attributed to many other people as well.

Additional problem for Chapter 9: Which of the following sets can be written as the Cartesian product of two subsets of $\mathbb{R}$? (either give the two sets or explain why two such sets do not exist):

1. $\{(x, y) : 0 \leq y \leq 5\}$;
2. $\{(x, y) : x > y\}$;
3. $\{(x, y) : x^2 + y^2 = 1\}$.

Add to problem 10.1: For $x, y \in \mathbb{R}^+$ define $x \sim y$ if and only if there exists a rational numbers m such that $x = y^m$.

Problem 11.9: you may want to point out to the students that the answer depends on how many sets there are. So you might ask them to see what happens when there are 2 sets and when there are more than 2 sets.

Suggestion of a problem for Chapter 11: Let $A = \{x \in \mathbb{R} : x > 0\}$ and let $B = \{x \in \mathbb{R} : x \leq 0\}$. Describe the equivalence relation associated with this partition.

Here's a nice topological problem: (This is from Croom's topology book, p. 28)

Consider the unit circle C with equation $x^2 + y^2 = 1$ in the plane. Define a relation $\sim$ on C as follows: for $(x, y) \in C$ say that (x, y) is related to itself and to its *antipodal point* $(-x, -y)$; in other words

$$(x, y) \sim (x, y) \text{ and } (x, y) \sim (-x, -y).$$

1. Show that this is an equivalence relation.

2. Think of C as a rubber band and imagine gluing together the equivalent antipodal points of C. Describe the resulting figure.

Chapter 13: you'll want to say something about real-valued functions and the implied domain of the function before assigning the homework.

p. 152 They'll need more details on why two functions are equal if their domains are equal and they are equal at all points of the domain.

It would have been nice to include exercises on projections and step functions in this chapter. The next edition will have some!

p. 178 We've been told that we should have said more in the first paragraph of this proof (how we got from $x_1^3 - 5 = x_2^3 - 5$ to $x_1 = x_2$.

Problem 16.4 parts (c) and (f): Have the students prove these parts.

Problem 16.6: show that your guess is correct means "prove it."

Problem 18.10 should say "find a different formula for f."

p. 255, in the line preceding Exercise 20.9 the set A should be nonempty.

The three problems below should remind students that saying that two sets are uncountable is not enough to prove that they are equivalent.

1) Add to the problems on p. 269: prove that $(0, \infty)$ and $[0, \infty)$ are equivalent. (This is a difficult problem for students.)

2) Add to the problems on p. 282: $(0, 1)$ is equivalent to $[0, 1)$.

3) Add to the problems on p. 282$(0, 1)$ is equivalent to $(0, 1/2) \cup [1, 2)$.

The following things are missing from the index:

$\mathbb{R}^+, \mathbb{Q}^+, 2\mathbb{Z}, 3\mathbb{Z}$, even integers.