General Suggestions

1. Given that many teachers / users of the book might not read *every* section, it would be helpful to add a glossary of all notation used throughout the book, to make finding missing vocabulary easier.

Chapter 3

1. Notational inconsistency. Section 3.1, page 53: “there is a designated set U_x in X with $x \in U_x$ such that $f(U_x) \subset V$.” Here, the X should be in math font, i.e. X.
2. Possible undesirable formatting. Section 3.1, page 55: in the statement of theorem 3.1 (“Let $\{U_i\}_{i=1}^n$ be a finite collection of open sets”), “finite” is not italicized, whereas the surrounding text is. This is likely due to the use of `\emph` inside an italicized environment. While this is indeed the expected behavior, it might be worth considering using boldface instead to emphasize finite.

Chapter 4

1.

Chapter 11

1. Simple typo. Section 11.4, page 194: “Intuitively, we know what at hole is.” Should be “what a hole is.”
2. Ambiguous parse structure. Section 11.4, page 194: “Another category of theorem we will prove is fixed point theorems.” While this sentence is grammatically correct if parsed as “Another (category of (theorem we will prove)) is (fixed point theorems),” it is easy for a first-time reader to parse the sentece as “Another (category of theorem) we will prove is (fixed point theorems),” which I think has a number agreement error (“category of theorem” is singular, “is” is singular, “fixed point theorems” is plural — easy to not realize “fixed point theorems” is the title of the category). Not sure if this is actually a problem though.
3. Number agreement error. Section 11.4, page 195: “Another type of theorem that we will prove are theorems about geometric separation.” This is sort of the dual of the part above — “type of theorem that we will prove” is singular no matter how you parse it, “are” is plural.

Chapter 12

1. Notational error. Exercise 12.1, page 199: “Show that the torus T^2 is homeomorphic to $\mathbb{S}^1 \times \mathbb{S}^1$.” Torus should be denoted $\mathbb{T}^2$.
2. Possible error. Section 12.1, page 201 — “The basis for the topology is the collection of open cones with the cone point at the origin.” I believe this should be double cones?

Chapter 15

1. Small typesetting inconsistency. Section 15.1, definition of a standard n-ball:

$$B^n = \left\{(x_1, \ldots, x_n) \in \mathbb{R}^n \;\middle|\; x_1^2 + \ldots + x_n^2 \leq 1\right\}.$$

In the definition of of the n-cube above this, $\cdots$ (`\cdots`) is used to indicate continuation of $\times$. Here, and in the definition of the standard n-sphere below it, $\ldots$ (`\ldots`) is used to indicate continuation of

+. This may be a matter of personal preference, but I've always assumed standard practice is to use $\ldots$ (`\ldots`)for the continuation of enumerations (e.g., sets or lists), and $\cdots$ (`\cdots`) for the continuation of operations. Either way, it probably ought to be consistent between + and ×.

2. Clarification suggestion. Section 15.1, definition of the standard n-sphere. We define

$$\mathbb{S}^n = \left\{(x_0, \ldots, x_n) \in \mathbb{R}^{n+1} \mid x_0^2 + \cdots + x_n^2 = 1\right\}.$$

   Since we're reindexing from 0 here (instead of adding an x_{n+1} coordinate), it might be worth pointing that out to the reader, especially seeing as both of the previous examples started indexing at 1. This could easily be incorporated into the note below without adding too much text, however it's non-essential.

3. Possible grammatical error. Section 15.1, definition of a manifold: "An *n-dimensional manifold* or *n-manifold* is a separable, metric space, M [...]". It seems like one or more of these commas should not be there — in this context, isn't "metric" usually used as an adjective? Either way, the comma usage is inconsistent with that in theorem 15.4 ("for a separable, metric space M^n, the following are equivalent").

4. Notational inconsistency. Section 15.1. "For example, in the closed disk $\mathbb{D}^2$, [...]". We defined $\mathbb{D}^2$ to refer to the unit square in the section above. Should this be B^2 instead?

5. Incomplete definition. Section 15.2, definition of affinely independent. "recall that a set of points $v_0, \ldots, v_k$ in $\mathbb{R}^n$ is *affinely independent* if $\{v_1 - v_0, \ldots, v_k - v_0\}$ is a linearly independent set." It should be mentioned that we require this for all v_i; v_0 is not privileged.

6. Incomplete definition. Section 15.2, definition of convex combination. "A *convex combination* of $v_0, \ldots, v_k$ is a linear combination of those points whose coefficients sum to 1." I believe it should also be mentioned that we require said coefficients to be non-negative.