BEGINNING TOPOLOGY NOTES and ERRATA (updated 3/23/12)

While I tried hard to make this edition error-free and as much as I had (naively) hoped this page would be blank, it is not. My thanks to those who have helped assemble this list, including James Conant, Joe Plante, Richard Potter, Richard Rimanyi, Russ Rowlett , James Stasheff, Sandi Shields, Konstantin Styrkas, Gabor Toth, and many of my students. If you notice additional errors in the book or have other suggestions, please let me know: seg@email.unc.edu

Page 4, line 5 Note that the *first* definition of limit points (with open sets) extends to this more general setting, not the sequence version in Prop. 1.1.6.

Page 7 Exercise 1.1.20: In ternary, 0.1 = 0.0222. . . (not 0.222. . .)

Page 9 Example 1.1.27: ~ should be defined as

(0, y) ~ (1, y) for all y in [0, 1],

and for any point (x, y) in X, (x, y) ~ (x, y) (hence reflexive)

and if $(x_1, y_1) \sim (x_2, y_2)$ then $(x_2, y_2) \sim (x_1, y_1)$ (hence symmetric—this is the correction)

Page 10 Example 1.1.28 Similar correction as page 9

Page 28 The open cover definition of compactness should be expanded to subspaces. Add: "*A subspace Y of X is compact if every family of open subsets of X whose union contains Y has a finite subfamily whose union also contains Y*."

Page 62 Step 5:

In Cut 2: note that the "beginning" of x^{-1} is the "end" of x.

In Cut 3: This would be clearer as *"Cut from the end of y to the end of x (call this cut z). . ."*

Page 63 Figure 2.35(b): The dotted curve labeled y should end at the vertex (not along the side labeled x).

Figure 2.35 (c): Similarly the dotted curve labeled z should begin and end at vertices.

Page 67 paragraph 3: *More precisely, a **cell-complex** (of dimension n) on a compact Hausdorff space X is a nested sequence of closed subspaces* $X_0 \subset X_1 \subset \cdots \subset X_n = X$ *such that* X_0 *is a finite set of points, and* $X_i \setminus X_{i-1}$ *is a finite, disjoint union of copies of the open i-dimensional disk. These open disks are the (open) i-cells. Furthermore, the boundary of each cell is a finite union of lower-dimensional cells.*

Page 79 Since a k-connected sum does not give a unique surface (the orientation depends upon how the disk boundaries are glued), change exercise 3.3.6 change to read : . . . define a "k-connected sum". . .

Page 93 last line, add period at end.

Page 98 Figure 4.7: The figure is slightly off. The face A should meet the top and bottom of the square in corresponding intervals. Same for faces B and C.

Page 102 line 7: Omit *"We in fact disallow them in this section."*

Page 102 lines 8-9, Omit "***Assumption.***" since parallel edges are allowed, for example, in Euler's theorem.

Page 107 Project 4.3.11: The goal is to arrange the cubes in a column so that each side of the column shows all four colors (that is, no two faces are the same color).

Page 110 Note that although Kuratowski's theorem is correctly stated, graph homeomorphism has not been defined, so a better statement is *"A graph is planar if and only if it cannot be transformed into K_5 or $K_{3,3}$ by a series of edge contractions and deletions, and vertex deletions."*

Page 110 last paragraph, correct *to Erdős*

Page 124 Figure 5.9 right side: the arrows are incorrectly drawn near the critical point. They should keep circulating around the critical point.

Page 126 line -6 Note that one can extend the vector field *w* to the interior in any way. This does not affect the rest of the argument.

Page 130 In the proof of theorem 5.2.6—while the aim is indeed to show that the value of the index of a critical point is independent of the choice of enclosing curve, all that is needed here is that the region between C and C* contains no critical points. Then choose C' interior to both so that the regions bounded by C, C' and by C*, C' contain no critical points. (In particular no mention of *p* is necessary.)

Page 132-133, proofs of theorems 5.3.5 and the Poincare-Bendixson theorem. An additional sentence might be helpful to explain why an orbit cannot turn around to meet Σ again in the opposite direction: *"Note that all orbits must meet Σ with the same orientation since Σ is never tangent to an orbit."*

Page 136 last paragraph and page 137 first paragraph should read:

"Draw a curve C, made up of pieces of orbits and pieces orthogonal to orbits, around a nonrotational critical point p so that C encloses no other critical points. To simplify counting the angle variation, we will assume that the separatrices bounding the various sectors are straight line segments.

Suppose we have $\mathcal{E}$ elliptic sectors, $\mathcal{H}$ hyperbolic, leaving $\mathcal{P}$ parabolic sectors as the remainder. Let $\alpha 1, \ldots, \alpha e$ be the angles between the separatrices bounding elliptic sectors. Similarly let $\gamma 1, \ldots, \gamma h$ be the angles of the hyperbolic sectors and $\beta 1, \ldots, \beta p$ the remaining parabolic. Figure 5.25 illustrates the subdivision into sectors and the associated angles for a critical point with sectors of each type."

Page 137 Figure 5.25 should then be as follows:

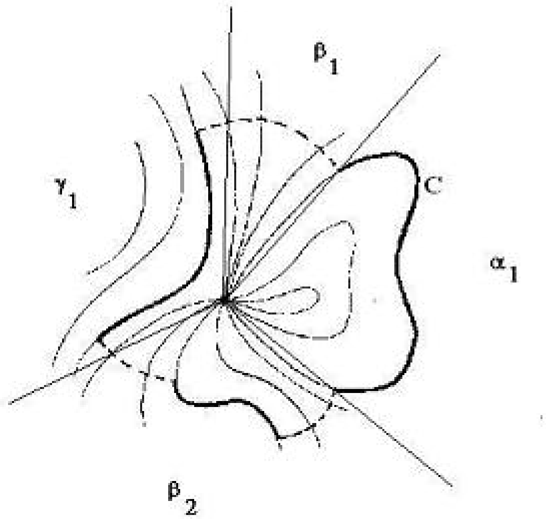

FIGURE 5.25
A subdivision into sectors and their associated angles.

Page 138 line 4: $(\gamma_1 - p)$ should read $(\gamma_1 - \pi)$

Page 147 last 2 lines—Note that one can define the index of a critical point on a nonorientable surface by the formula in theorem 5.4.3 and use an oriented double cover of the surface.

Page 199 and page 232 M. Thistlethwaite's name is misspelled. My apologies.

Page 224 The Kauffman polynomial as defined here is more properly referred to as the Kauffman's *"X-polynomial"* or the *"normalized bracket polynomial"* to distinguish it from the more powerful 2-variable invariant polynomial F_{K} as defined in Kauffman's TAMS paper "An Invariant of Regular Isotopy"