Errata for *Handbook of mathematical induction: theory and applications*

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I deeply thank all those whom have helped me find errors. As you see below, many people were very careful with their reading, and were extremely helpful! Please also let me apologize for my (many, many) mistakes, those below, and those not yet discovered. Some of my mistakes were nearly unforgivable, and I hope that they did not cause too much grief.

The list below contains mostly errors in content or typesetting. Negative line numbers count from the bottom of the page. Square brackets contain names of contributors.

- p. 5, line 6: Missing "i" in "...Steinhaus in ...". [Paul Stanford]
- p. 17, line 8: Missing "a" in "...are a little on ..." [Paul Stanford]
- p. 30, line 11: Delete space just before the comma in "*set* ," .
- p. 30, line -13: "$q \in Q$, $x < Q$" should be "$q \in Q$, $x < q$" [Paul Stanford]
- p. 37, midpage: When proving weak from strong, it may be simpler to note that $S(m) \to S(m+1)$ implies $[S(1) \wedge \cdots \wedge S(m-1)] \wedge S(m) \to S(m+1)$. [Paul Stanford]
- p. 47, line -9: Delete space after "Germain". [Paul Stanford]
- p. 51, line 14: missing "that" in "...the fact that every vector..." [Paul Stanford]
- p. 52, lines 7–8: add the case $S = \emptyset$, as in "...S is an initial segment of W (even when $S = \emptyset$) or $S = W$." [Paul Stanford]
- p. 53, line 4: "...induction; however, it applies..."
- p. 55, line 10: "...number (or *cardinality of*) for..." should be "...number for (or *cardinality of*)...". [Paul Stanford]
- p. 60, in first proof of Theorem 4.5.4: insert "and" in "...X be a set let..." to give "...X be a set and let...". [Paul Stanford]
- p. 73, line 18: In the last expression of multiline display, the n should be k. [K. Johannson]
- p. 78, line 16: "...found Guy's..." should be "...found in Guy's...". [Paul Stanford]
- p. 79, line 7: "...with to the..." should be "...with the...". [Paul Stanford]
- p. 95, line 3: delete "by", giving "...prove a weaker result...". [Paul Stanford]
- p. 96, line 6: right parenthesis missing, colon in wrong spot, replacing period, giving: "INDUCTIVE STEP ($S(k) \to S(k+1)$): For some ..." [José Espinosa, *et al.*]
- p. 96, line -6: denominator missing left parenthesis: $((1-x)^{k=1})^2$. [Paul Stanford]
- p. 125, line 16, first sentence of second text paragraph, "many of " and "proofs" are plural, yet "a pictorial representation" is not. Try "...have a "proof without words", that is, a convincing pictorial representation of a proof."
- p. 149, Exercise 133: *cos* should be cos. [Paul Stanford]

- p. 153, line -7: $log_b(n)$ should be $\log_b(n)$. [Paul Stanford]
- p. 163, Theorem 11.1.2: the condition "n not a multiple of m" is not necessary, and if deleted, $k \geq 2$ can be replaced by $k \geq 1$. [Paul Stanford]
- p. 168, comment between Exercises 227 and 228: change to "..."Fermat's little theorem", even though Fermat never gave a proof; the first proof appeared by Leibniz, and it was by induction (although the now standard ...)." [need reference for this story]
- p. 168, line -2: 4×10^14 should be 4×10^{14}. [Paul Stanford, *et al.*]
- p. 188, line 6: "$y, a, a, 4$ should be $y, a, a, 3$. [Paul Stanford]
- p. 204, line 3: delete "the", to read "...but from the formula". [Paul Stanford]
- p. 210, line -3: parentheses missing in $N_a(n, k-1)$. [Paul Stanford, *et al.*]
- p. 217, Exercise 417: insert "the" to read "...that the number of...". [Paul Stanford]
- p. 219, Exercise 426; delete the second "and" to read "...and for any subsets...". [Paul Stanford]
- p. 220, Exercise 429: delete the first "if" to read "...property that $F \in \mathcal{F}$ if and only if...". [Paul Stanford]
- p. 221, line 10: delete "the" to read "...all b-element subsets...".
- p. 229, line 22: interchange X and S to read "...= $\{X : X \subseteq S\}$...".
- p. 230, line 10: "Proof:" should be boldfaced as in "**Proof:**".
- p. 231, lines 5–6: The first sentence is poor, and the second sentence is not finished (the rest of the original sentence continued beneath Exercise 454). Replace lines 5–6 by simply: " By Theorem 13.4.3, to prove Theorem 13.4.4, it suffices to show that any proper filter can be extended to a maximal filter. "
- p. 235, line 3: (This one is really embarassing!) "symmetric" should be "reflexive". In fact, it is better if the sentence says: "Recall from Section 3.6 that for a set L, a partial order on L is a binary relation $\leq$ that is reflexive, antisymmetric, and transitive; in other..."
- p. 236, line 13: the set right set bracket should be moved to the end:

$$A' = A \cup \{T_0, F_0, \neg, \wedge, \vee, \rightarrow, \leftrightarrow, (,)\}.$$

- p. 237, Exercise 469: displayed formula, j should be i.
- p. 240, line 8: replace "the" by "a" to read "If a graph is named G,...".
- p. 241, line -1: B should be G. [Daniel Farlow]
- p. 242, Lemma 15.2.3 should read "Let T be a tree with at least two vertices. Every edge in T is a bridge, and removal of any edge creates two trees." (The present version is still true, but vacuous for a single vertex tree.) Lemma 15.2.4 also needs an extra condition: "Every tree on at least two vertices has at least two leaves." (The lemma is false for a single vertex tree.) [Paul Stanford]
- p. 244, line -4: delete the extra quotation mark in "'complete". [Paul Stanford]

- p. 246, line -2: delete "using" to read "...all edges having one...". [Paul Stanford]
- p. 247, Kruskal's algorithm: base step could be the empty graph on V. In the recursive step, delete the extra "does not". [Paul Stanford]
- p. 256, line -6: The notation $ex(n : K_{k+1})$ is not defined! So, insert just before Theorem 15.9.1 the following: For a positive integer n and graph G, let the *extremal number* $ex(n; G)$ be the maximum number of edges in any graph on n vertices that does not contain a copy of G. [Paul Stanford]
- p. 258, Exercise 519, displayed equation: right parenthesis missing in $(d^+(x_i))^2$. [Paul Stanford]
- p. 263, line 4: change "$n = s_1$" to "$s_1 = n$". [Paul Stanford]
- p. 277, line -12: comma missing; should read "$1 \to 2$, $2 \to 3$, $1 \to 2$, ...". [Paul Stanford]
- p. 281, line 2: insert "fact" to read "(the nearly obvious fact)". [Paul Stanford]
  line 3: delete the extra "and".
- p. 286, line -15: move period outside of right parenthesis to read "...overlooked here)." [Paul Stanford]
- p. 287, line 5: add "pp." so that the citation reads "[119, pp. 947–957]".
- p. 291, line -6: The first sentence of the Remark is incorrect and should read: "A position is an N-position iff there exists a proper move to a P-position. " The second sentence is okay. [Paul Stanford]
- p. 298, fifth bullet should read "..."if any of you know for certain whether or not your forehead is muddy, ..."." This modification is not necessary, but it makes the last sentence in Proposition 17.4.1 correct.
- p. 298, line -4: The sentence starting "Furthermore..." is not correct with the existing definition of the puzzle; if the last condition were to have the slightly different statement: "if any of you know for certain whether or not your forehead is muddy, ...", then Proposition 17.4.1 is okay. [Paul Stanford saw that 17.4.1 is false, as is.]
- p. 306, line 20: insert "in the" to read "...contained in the following...".
- p. 312, Exercise 600: the term "$f(x(f(y))$ " has an extra parenthesis; it should read "$f(xf(y))$". [Paul Stanford]
- p. 329, line -10: delete the extra period at end of paragraph. [Paul Stanford]
- p. 339, line 5: M4 should have read "$\forall a \in \mathbb{F}\backslash\{0\}$, $\exists b$...". [Paul Stanford]
- p. 339, line 9: delete last parenthesis in $(a + b) \cdot c)$. [Paul Stanford]
- p. 342, line -16: delete the last T in "$T : V \to V$ T" to read "$T : V \to V$ is called...". [Paul Stanford]
- p. 343, line 2: Left justify "**Proof idea:**.
- p. 347, line -10: Delete the "a" to read "A set W of vectors...". [Paul Stanford]

- p. 351, line 6: upper limit on sum is missing, which is m, giving "satisfying $\sum_{i=1}^{m} \alpha_i = 1$, the convex...".
- p. 353, line 1: Delete the extra "make", to read "...scaling, make this new ...". [Paul Stanford]
- p. 359, lines 2–3: Replace all four occurrences of "F" with "X". [Paul Stanford]
- p. 360, line -3: perhaps better notation is V_n or B_n, instead of Z_n. [Paul Stanford]
- p. 361, Exercise 728: perhaps better notation is Z_n, instead of ZZ_n. [Paul Stanford]
- p. 362, Exercise 735: (This is what happens when one does not write up the solution.) The number of parts should be $n(n-1)+2$, not $n(n-2)+2$. [Krista Reimer]
- p. 381, line 6: The second factor should read $\mathrm{Sh}\Big(\mathrm{HJ}(t,1,r), r^{(t+1)^{HJ(t,1,r)}-1}\Big)$. [Brian Ketelboeter]
- p. 382, lines 4,5: each Δ_i should be simply Δ. [Brian Ketelboeter]
- p. 385, line 12: right parenthesis missing: "...$(a = \{0, 1, \ldots, a-1\})$...".
- p. 387, line 5: replace last comma in quotation with period. [Jason Klusowski]
- p. 388, Def'n 22.1.1: Ω needs to be finite (or countable) for sum to make sense. [Jason Klusowski]
- p. 390, First line of section 22.1.3: insert "discrete", to read "... a discrete random variable X ...". [Jason Klusowski]
- p. 391, Lemma 22.1.9: Add "discrete" to give "...any discrete random variables.." [Jason Klusowski]
- p. 392, Lemma 22.2.1: X should be N. [Jason Klusowski]
- p. 393, line -8: ...$|X_n - 1]]$ should be ...$|X_{n-1}]]$. [Jason Klusowski]
- p. 396, Exercise 767: add zero to the set to give $\{-1, 0, 1, 2, 3, \ldots\}$. [Paul Stanford]
- p. 432, Exercise 44, base step does not say that, and it is false anyway. It should read "...$S(1)$ says $2 \cdot 1 + 1 = 3 \cdot 1^2$, which is indeed true." [Robin Waneka]
- p. 575, line 10: left parenthesis missing, and move clause to right.
- p. 576, line 7: put parenthesis around "by ind. hyp", and move to right.
- p. 583, line -6: change equality to congruence: "$\equiv f(k)$, although equality is correct, too. [José Espinosa]
- p. 585, lines 8 and -8: the first parenthesis of "$3(f(3k+1)+5$ is divisible by 8,..." is to be deleted. [José Espinosa]
- p. 585, line 14: the last 2 should be a 4, giving "...$9f(3k+1)+4)+5$. [José Espinosa]
- p. 585, line 20: add -1 to end of line, giving "...$= f(3k+5) - 1$. [José Espinosa]
- p. 585, line 21: change second $3k+4$ to $3k+3$. [José Espinosa]
- p. 585, line 22: add closing parenthesis to end of line.

- p. 585, line -7: change ks to ns to read "...integers n, $f(3n) + f(3n+1)$ is divisible by 32." [José Espinosa]
- p. 592, add to the end of Exercise 295 (after part (d)): *Note:* Parts (c) and (d) can also be proved independently of (a) and (b), a task made easier by first examining the case when d is not divisible by 3. [José Espinosa]
- p. 616, Exercise 347, line 4: Change to "...says to consider separately cases when n is even and when n is odd, and ...". [José Espinosa]
- p. 624, line 13: delete comma, giving "...begin with the left side:"
- p. 624, line 18: the subtract sign should be plus, giving "...$(F_{k+1} + 2F_k)$.... [Rob Borgersen]
- p. 635, line 5: add "(by $S(k)$)".
- p. 650, line 3-: add period at end of displayed equation.
- p. 651, line 8: Add "of" to read ".. by induction on n of the ...".
- p. 678, line 2: B should be G. [Daniel Farlow]
- p. 678, line 13: move "(by $C(m)$)" to the right.
- p. 692, line -6: "edges" should be "vertices".
- p. 696, line 9-: add "This theorem and its proof also appears in [59, p. 110, Thm. 7]."
- p. 703, line 4: insert "trivial" to read "...nearly trivial since...".
- p. 725, line 21: "mudddy" should be "muddy".
- p. 776, line 3: the second sum begins $i = 1$, not $i = 0$. [Jason Klusowski]
- p. 776, Exercise 696, first line: delete the first "be".
- p. 826, last line: add 696 to list of pages where item is cited.
- p. 866: combine entries for Bisztriczky.