

Errata and Addenda to
AN INTRODUCTION TO BRAILLE MATHEMATICS

February 15, 2014

References to the *Code of Braille Textbook Formats and Techniques* should be changed throughout to "the most recent revision of *Braille Formats: Principles of Print to Braille Transcription*".

LESSON 1

p. 1, §2.b. **Partially Technical Texts:** Delete the last two sentences (starting with the word "However") and replace them with the following:

However, when the replacement of symbols by words is not practical or possible, or when the mathematical display is used for solving equations or performing computations, the symbols and rules of the Nemeth code must be used and identified according to the provisions of the most recent revision of *Braille Formats: Principles of Print to Braille Transcription*.

p. 1, §2.c: Replace this section with the following:

§2.c. Technical Texts: A technical text is a work in the field of mathematics, statistics, physics, or chemistry. Such texts must be transcribed entirely according to the rules of the Nemeth code. (Chemistry texts must follow the rules of the *Braille Code for Chemical Notation*, 1997.) The symbols and rules of the Nemeth code must also be used in works in other fields which make substantial use of mathematical or scientific notation. Since several revisions of the Nemeth are in use, a transcriber's note stating that the text is transcribed in Nemeth code and giving the year the code was adopted must be included in the transcriber-generated pages of each volume according to the provisions of the most recent revision of *Braille Formats: Principles of Print to Braille Transcription*. The codebook title, year of revision, and any further updates should be included in the note.

p. 8, §12: Change "41" to "40."

p. 9, HOMEWORK directions:

step (2): Change "41" to "40."

Add this directive:

(6) Do not divide words at the end of braille lines.

LESSON 2

p. 15, §19: Add the euro symbol to the list of monetary signs:

Euro €

p. 16, §20: The prime sign ' should be added in the space between the section heading and the simbraile symbol.

p. 17, §22: In the second sentence, delete the words "a minimum of."

p. 17, §23.a, Example 3: In the braille, add dot 3 to "and".

p. 21, §28: Delete the second sentence and replace it with the following:

One line must be left blank above such instructions unless they follow a cell-5 heading. Follow the provisions of the most recent revision of *Braille Formats: Principles of Print to Braille Transcription* for spacing following a page-change line.

EXERCISE 2 (pp.23+)

#45: In the print, the dot between the word "or" and the numeral "9" should be moved closer to the "9." It is a decimal point.

LESSON 3

p. 29, In the last listing under the names of Greek letters, change "(goph)" to "(qoph)."

p. 33, §30.c, Example 1: There should be no space between each of the four letters and its respective punctuation mark. *Simbraille* is correct.

p. 33, §30.c, Example 4: There should be no space between the German letter and the following hyphen. *Simbraille* is correct.

p. 34, §31 Example 2: There should be no space between the paired Greek letters. *Simbraille* is correct.

p. 40, §34: Change the first sentence to read as follows:

Abbreviations consisting of letters must be capitalized and punctuated in accordance with the rules of English braille.

p. 42, §35.b Insert the word “Nemeth” before the last word in the first sentence: “... according to other rules of the Nemeth code.”

p. 43, §35: Add a new subitem c:

c. In an abbreviation which consists of a combination of unspaced numbers and letters, each letter of the abbreviation must be preceded by the single capitalization indicator. Letter/number combinations are punctuated mathematically.

(1) The car was equipped with 4WD.

p. 43, §36.a Only the first sentence is valid. Delete the final two sentences, starting with "Abbreviations must be placed ...".

p. 46, §38.a, Example 5: In the print change the word "year" to "Year." In the braille add dot 6 between the opening quotation mark and the letter "y" in "Year": ☈ ☉ ☊ ☋ ☌ ☍ ☎

p. 48, §39: Add Example (4):

(4) 8:00 a.m. - 3:00 p.m.

EXERCISE 3 (pp.48+)

- #7: The second letter should be the alternative form of the Greek letter beta. Add commas between the letters.
- #9: There should be no space between the second Greek phi and the period.
- #28: Delete the comma after the letter "q."
- #43: There should be no space between the hyphen and the letter "c" of the word "coordinate" in "st-coordinate planes."
- F: Change the numeral "10" to "20." The expression will now read: 3 lb 20 oz = 4 ____ 4 oz.

LESSON 4

p. 55, §42.a, Example 4: In the print add the missing script 4. 

p. 55, §42.b, Example 3: In the print the digit "5" is shown in script boldface type. Change it to regular boldface type. *Simbraille is correct.*

p. 56, §43.a: Replace the text with the following:

a. When it is necessary to show that a compound expression consisting of a numeral and a word or abbreviation joined by a hyphen is entirely printed in the same nonregular type, the appropriate type-form indicator must be used at the beginning of the expression. The effect of the type-form indicator extends throughout the compound expression.

Add the following examples:

To §43.a, add:

(3) **Uranium-235**



(4) **Uranium-235**



To §43.b, add:

(2) ***Uranium-235***



(Uranium in italic type, 235 in regular type)

To §43.c, add:

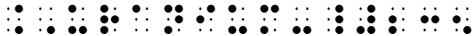
(2) **Uranium-235**



(Uranium in regular type, 235 in italic type)

To §43.d, add:

(2) ***Uranium-235***



(Uranium in italic type, 235 in bold type)

p. 59, §46: Add the following new item c and example:

c. If the print copy shows an italicized phrase consisting of three items which both begins and ends with a word, each item must be individually italicized using the appropriate italics indicator for each item.

- (1) John lost 20 dollars.

(English Braille italics with "lost" and "dollars;" Nemeth Code italic type indicator for "20.")

p. 59, §47.a, i: Replace the text with the following:

A line must be left blank before the beginning and after the end of the entire labeled statement or formal proof.

p. 59, §47.a, iii: Delete the present text and substitute the following:

iii. If the labeled statement or formal proof contains auxiliary captions such as Given, Prove, or Conclusion, etc., such captions must begin in cell 3 and their runovers must begin in cell 1. A line must not be skipped above a caption. A caption should be capitalized or italicized in accordance with the print text. If the caption is in boldface type, it should be entirely capitalized in braille.

EXERCISE 4 (pp.62+)

#s 1, 2, 3, 4, 5, 6, 7 and 10: There should be no space between the last two letters in each of these examples.

#s 17, 18, 19 and 20: There is insufficient contrast between regular type digits and boldface type digits. In the examples below the boldface type digits are clear.

17. 893,**7**41
 18. **9**99,9**9**9
 19. 522,**4**89
 20. **3**00 + **3**00 = **6**00

LESSON 5

p. 70, §51, Example 10: Add the following note:

Note: The numerals are in bold type.

p. 77, §57.c

Example 1: In print, the digit "2" following the word "red" should be in black type. The first "2" in the numeral "22" should be in red type. The braille should be replaced with the following:

- (1) ० १ २ ३ ४ ५ ६ ७ ८ ९ ० १ २ ३ ४ ५ ६ ७ ८ ९

Example 2: Replace the braille with the following:

(2) **•••** **••••••••** **••••••••** **•••** **••••••••** **•••** **••••••••** **•••** **••••••••** **•••** **••••••••**

••• **••••••••** **••••••••**

Example 4: Replace the braille with the following.

p. 79, §58.b, Example 2: There should be no space between the print characters \$¢%
This transcriber's note is best placed *before* the material it describes. Replace the braille
with the following:

LESSON 6

p. 84, §60.b: Change the second and third sentences in the first paragraph to read as follows:

The numeric subscript may contain a segmenting comma or a decimal point. The letter may carry one or more primes or a superscript, may be taken from any alphabet in any type form, and may be part of a two-letter chemical abbreviation.

p. 88, §62.b, Example 3: The *apostrophe-s* applies to the entire expression. In the print example, each apostrophe should be moved up to a level equivalent to the apostrophes shown in Example 4.

p. 88, §62.c, Example 3: In the simbraille the two commas should be mathematical commas (dot 6).

(NOTE: The print is enlarged to show detail in the remaining examples for this lesson. All characters are meant to be in regular type, and all letter xs are lower-case.)

p. 92, §63.d, Example 2: Change the print to: 10^{-23}°F Simbraille is correct.

p. 96, §68.b

Example 4: Change the print to: A_{i^{k+1}} Simbraille is correct.

Example 5: Change the print to: $n_a X$ Simbraille is correct.

Example 6: Change the print to: $a^n X$ Simbraille is correct.

p. 96, §68.c. Example 1: Change the print to: $X^{n_{r_j}}$ Simbraille is correct.

p. 96, §68.d, Example 1: Change the print to: X^{y_r_n} Simbraille is correct.

p. 96, §68.e, Example 1: Change the print to: $X^{y^z^n}$ Simbraille is correct.

p. 97, §68.g, Example 1: Change the print to: X_{v^{r_n}} Simbraille is correct.

p. 97, §68.h, Example 1: Change the print to: X_{v^{r_n}} Simbraille is correct.

p. 97, §68.i, Example 1: Change the print to: X_{y_rn} Simbraille is correct.

EXERCISE 6 (pp.101+)

#16: Close up the spacing in the superscript. The superscript should be printed as follows:

$$25x^2 - 10x - 1$$

#17: Close up the spacing between the e^2 and the opening parenthesis.

#40: The subscript "t = 1" to the right bracket is not meant to be boldface.

#41: Replace the expression with the following:

$$x^{2+4+6+\dots+n}$$

#43: Replace the expression with the following:

$R_{s_1, s_2, \dots}$

#61: Replace the print with the following:

61. a'_1, a'_2, \dots, a'_n are inverses of ?.

#62: There should be no space between the prime sign and the opening parenthesis in the left side of the equation.

#66: Replace the expression with the following:

$$e^{x_1+x_2+x_3+\dots+x_n}.$$

#67: The zero should be in regular type instead of boldface type.

LESSON 7

p. 105, §72.a, Example 8: The braille example is incorrect and should be replaced with the following:

(8) ♩

p. 106, §72.a, Example 20: Move the double primes to the right in three places (primes are to the complete fractions, not the numerator). *Simbraille is correct.*

p. 109, §75, Example 10: In the print the double primes should be moved to right in both places.
Simbraille is correct.

p. 115, §82: In the first print line and in the listing, delete the tiny vinculum from the radical sign. Change the third sentence to read as follows:

The expression following the radical sign is called the *radicand*.

p. 117, §83.b, Example 13: Delete the vinculum from each of the two print radical signs.

p. 120, §88, Example 3: Delete the vinculum from the print radical sign.

p. 121, §89.b, Example 3: Replace the simbraille with the following:

(3) **U.S.A.** **U.S.A.** **U.S.A.** **U.S.A.** **U.S.A.**
 U.S.A. **U.S.A.** **U.S.A.** **U.S.A.**
 U.S.A. **U.S.A.** **U.S.A.**
 U.S.A. **U.S.A.** **U.S.A.**
 U.S.A. **U.S.A.** **U.S.A.**
 U.S.A. **U.S.A.** **U.S.A.**
 U.S.A. **U.S.A.** **U.S.A.** **U.S.A.** **U.S.A.**
 U.S.A. **U.S.A.** **U.S.A.** **U.S.A.**

p. 122, §89.c: Replace the text paragraph with the following:

c. In itemized text without subdivisions, a displayed expression must begin in cell 5 and its runovers must begin in cell 7.

p. 123, §89.c, Example 3: Replace the simbraille with the following:

p. 124, §89.d: Replace the text paragraph with the following:

d. In itemized text with subdivisions, a displayed expression must begin in cell 7 and its runovers must begin in cell 9, regardless of whether it applies to the main division or a subdivision.

EXERCISE 7 (pp.126+)

#36 (h): Primes are to the complete fractions, not just the numerators.

#65: Delete the vinculum from the radical sign.

#66: Delete the vinculum from each of the three radical signs.

#68 (d): There should be no space between the two radical expressions.

#68 (e): There should be no space between the two radical expressions.

LESSON 8

p. 136, §94.a, Examples 3 and 4: Replace the simbraille with the following.

(3) ::::: ::::: ::::: ::::: ::::: :::::

(4)                          

p. 144, §97.c, Examples 1 and 2: The footnotes are incorrectly formatted. Replace the braille with the following. The ellipsis indicates the possibility of additional text between the example and the end of the print page.

(1) 1.6 0.000000 0.000 0 0.000000 0.000
0.000 0 0.000000 0.000 0.000000 0.000
0.000000 0.0 0.000000000 0.000000000
0.000
0.000
0.000000000
0.0 0.0 0.000 0.000000000 0.0 0.000000000
0.000 0.0 0.000000000 0 0.000 0.000000000
0.0 0.000000000

EXERCISE 8 (pp.145+)

#6: Change the sentence ending period to a question mark.

#45 (e): There should be no space between the first logical product sign and the tilde which follows it.

LESSON 9

p. 156, §106: The second print arrow in the list (pointing right, contracted form) should have straight barbs, not curved barbs.

p. 159, §107.m: Add the word "given" to the title as follows: **Vertical Bar (such that, given):**

p. 160, §108.b: Change the label "Oblique Stroke" to "Oblique Bar." Change the narrative to read as follows:

As shown in **c** through **k** below, a single bar (horizontal or oblique) or an equals sign may appear as part of a sign of comparison compounded vertically. The horizontal or oblique bar is often substituted for the equals sign in compounded signs of comparison.

Simbraille is correct.

p. 163, §108.g, Example 2: Replace the print with the following: {A} $\bar{=}$ K *Simbraille is correct.*

LESSON 10

p. 169, §113: The second paragraph should begin as follows:

Except for the symbol representing an equilateral triangle, when the shape is a *regular polygon* ...

p. 170, §113: Add the keystroke indicator to the list of shapes.

Keystroke Indicator ::::
(Limited to use with calculator and computer related text.)

p. 179, §121.a, Example 4: The print shows a rhombus but it should be a parallelogram. Change the drawing to a parallelogram. *Simbraille is correct.*

p. 179, §121.b, Example 3: The triangles shown are isosceles triangles but should be right triangles. *Simbraille is correct.*

p. 181, §122.a, Example 3: Change the print to read: $\odot O$ denotes "circle O." *Simbraille is correct.*

p. 181, §122.b, Example 1: Change the description to read as follows:

(the symbol for the "square" is used as a sign of omission representing a comparison sign.)

EXERCISE 10 (pp.182+)

#7 and #8 (a): The 4-sided drawings are of rhombuses. Change both drawings to parallelograms.

#16: There should be no space between the superscript circle and the opening parenthesis.

#25: The drawn 4-sided shapes should be changed to parallelograms.

#28: Change the drawn subscript rhombus to a parallelogram. The letters identifying the shapes should be on the same level (subscript) as the shapes themselves.

#32: Move the second line of print to follow the first sentence on the same line. This is not a new paragraph.

LESSON 11

p. 188: Remove examples (20)-(25).

p. 189, §125.b, Example 30: The subscript α to the capital A should be moved upward to a position where it straddles the base of the print line. A_{α}

p. 190, §125.c, Example 12: Add the following note:

The prime sign is printed to apply to \bar{x} , not just the x .

p. 191: **§125.c. Contracted Form of Modified Expressions:** now has two subsections i. and ii. The first subsection, i., is what is currently printed. Insert the new subsection ii. and six examples as follows:

ii. When a single digit or a single letter (in any type form or any alphabet) is modified only by a single horizontal bar directly under it, the directly-under indicator followed by the symbol for the bar must be placed immediately after the digit or letter modified, and the five-step rule must not be used. In all other cases, the five-step rule in a above must be applied.

- (1) \underline{x} 

(2) $\underline{3}$ 

(3) $x+y$ 

(4) A (sn) 

(5) 579 

(6) R^+ 

p. 192, §126.b, Example 1: In the print example, the upper horizontal bar should be extended at both ends to cover the opening and the closing parentheses. *Simbraille* is correct.

p. 193, §127, Example 10: In the print example, the "a" of the modifier should be shown in regular type, not in italic type. It should be made to look like the "a" shown in Example 12 of this section. *Simbraille* is correct.

p. 194, §128.a, Examples 13 and 14: The contracted form of the directly-under horizontal bar should be applied to these two examples. Replace the simbraille with the following.

p. 195, §128.b, Example 1: The contracted form of the directly-under horizontal bar should be applied to this example. Replace the simbraile with the following.

(1) :• :• :• :• :• :•

p. 195, §128.c, Example 6: In print the subscript to the letter "b" is shown as the letter "l" ("ell"). Change the "ell" to a "one" (1). *Simbraille is correct.*

p. 196, §128.d, Example 6: In the print example the modified parenthetical subscript should be moved closer to its base line expression "P." (There should be no space). *Simbraille* is correct.

p. 197, §129.a: The following print examples need some corrections. *Simbraille is correct in all.*
In the print example ...

Example 3: ... the length of both arrow shafts should be the same.

Example 4: ... the right-pointing arrow should be extended to completely cover the expression $P_1 P_2$ but not the vertical bars.

Example 5: ... there should be no space between each λ and its subscript in two places.

The two subscripts with their arrow modifiers should be moved downward to show they are subscripts.

Example 6: ... the arrow should be at the midpoint of the base-line material. Its modifier is correctly placed above it.

Example 7: ... the arrows should be at the midpoint of the base-line letters.

p. 199, §130.b: Delete the phrase "mathematical expression" and replace it with "single letter or numeral".

p. 200, §131, Example 5: In the braille example, the drawn brace should have its point moved leftward so that it is centered.

p. 202, §134.a, Example 7: Replace the transcriber's note with the following:

.....
.....

p. 203: §134.a, Example 8: Replace the transcriber's note with the following:

.....
.....

p. 204: §134.e, Examples 3 & 4: In the print examples, the vertical bars should be centered to the "x."

p. 204, §134: Add a new subsection f, as follows:

f. The multipurpose indicator must be used when a letter is followed by a numeral in an abbreviation consisting of an unspaced combination of letters and numerals.

(1) MP3 player

(2) QE2

EXERCISE 11 (pp.204+)

#9: The two arcs should be centered and extended to completely cover "AB" and "CD."

#14: Shorten the bars under the "C" and "R" so they do not include the asterisks.

#23: Shorten the bar over the "6" so that it does not include the apostrophe.

#27: Replace the second expression with the following:

$$\sum_{\substack{i < j \\ i \neq j}} \Sigma \Sigma$$

#28: The bar is over only the "r" in \bar{r}_{ij} . The last " θ " is in boldface type but the caret above it and the subscript "i" should be in regular type.

#33: The two carets should be moved downward closer to the two Greek letters they modify.

#39: The half-barb arrow should be extended so that it covers P_1P_2 entirely.

#40: The half barb arrow should be extended so that it covers OP_3 entirely.

LESSON 12

p. 209, §135.c, Example 1: Delete the bar under the boldface **i**. *Simbraille is correct.*

p. 210, §135.d. Example 5: Add a period to the end of the print expression. *Simbraille is correct.*

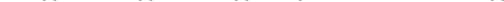
p. 212, §135.g: Replace the braille in the following three examples:

Also, add this note:

Note: In print it is quite common that dx dy are spaced in the expression. In braille this space is omitted.

p. 215, §136.c: In the heading and in Examples 1 and 2, change the print for all the ditto marks from “ to ”

p. 215, §136.d. Example 2: Replace the braille with the following:

(2) 

p. 216, §137.b: In the first paragraph of narrative, change the semicolon to a period and delete the last phrase "the English braille symbol must not be used."

pp. 219-220, §140, Examples 3 and 4: Replace the braille with the following:

p. 221, §141, Example 5: In the print example, change the lower-case letter "ell" to the numeral "1" (one). *Simbraille is correct.*

EXERCISE 12 (pp.221+)

#2: The print shows "l/x" (letter "ell" over letter "ex"). Change it to read "1/x" (numeral "one" over letter "ex").

#21: Change each of the eight ditto marks from “ to ”

#30: Close up the spacing in $\epsilon_0 \oint E \cdot dS = q$, (*Nothing is meant to be bold.*)

LESSON 13

p. 226, §145.a, Example 4: The print shows a boldface 1 in the numerator. Change to a regular 1.
Simbraille is correct.

p. 226, §145.a, Example 7: Insert a space following the closing fraction indicator. Simbraille should read as follows:

(7) ♫ ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪ ♪

p. 227, §145.a, Example 21: Change the print to read: $\sin 2\alpha = 2 \sin \alpha \cos \alpha$ Simbraille is correct.

p. 232, §147.b, Example 10: The print should read: $3^{\log_3 7} + 2^{\log_2 5}$ Simbraille is correct.

p. 233, §150: In the second paragraph, first sentence, change the word "may" to "must".

§151 note: In order to illustrate division rules, a short braille line of fewer than 40 cells is used. A simulated right page edge is added to the examples below.

p. 233, §151, Example 3: There is room on the first line for six more digits before division is necessary. Simbraille should read as follows:

(3)

p. 234, §152.a.i, Example 3: Two more members of the set fit on the first line, within the given margins. Simbraille should read as follows:

pp. 234-235, §152.a.ii, Examples 1-4: Add this note:

Examples 1 through 4 are assumed to be displayed expressions.

pp. 236-240: Many of the runover sites are in need of correction in these examples, shown below.

pp. 236-237, §152.a.iii: The braille must show an additional runover immediately preceding the equals symbol in several examples. Replace the simbraille with the following:

Example 9: In the print the alpha should be subscript to the integral; beta should be superscript to the integral. *Simbraille is correct.*

p. 237, §152.a.iv:

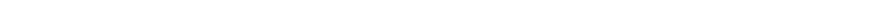
Add a second and third sentence:

Avoid division within a numerator or within a denominator. If the numerator or denominator requires a division, division at the fraction line must also be applied.

Example 3: The braille must show an additional runover immediately preceding the baseline indicator followed by the fraction line symbol. Replace the braille with the following:

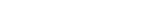
p. 238, §152.a.v: The braille must show an additional runover in several of these examples:

Example 1: In addition to the runover shown, divide the expression immediately preceding the division symbol. Replace the braille with the following:

- (1) 
 

Example 2: In addition to the runover shown, divide the expression immediately preceding the second opening parenthesis and also immediately preceding the equals symbol. Replace the braille with the following:

Example 3: In addition to the runover shown, divide the expression immediately preceding the equals symbol. Replace the braille with the following:

- (3)    
  
  

Example 5: In addition to the runover shown, divide the expression immediately preceding the baseline indicator followed by the fraction line symbol. Replace the braille with the following:

Example 7: Delete example (7).

p. 239, §152.a.vi, Example 3: The braille must not be runover in the place shown. The logical unit priority places brackets higher than the bracketed expression's superscript and subscript. Keep the bracketed expression together. Replace the braille with the following:

- (3) ♩ ♪ ♫ ♬ ♪ ♫ ♬ ♩ ♪ ♫ ♬ ♪ ♫ ♬ ♩ ♪ ♫ ♬ ♪ ♫ ♬

p. 239, §152.a.vii:

Replace the narrative with the following:

vii. When multiple factors of a math statement are each enclosed within grouping signs, division should be made between factors and not within a factor.

Example 1: The math is incorrect. $81x^4y^4$ should be $81x^8y^4$

In addition to the runover shown, divide the expression immediately preceding the equals symbol. Replace the braille with the following:

(1) ♪ ♫ ♬ ♭ ♮ ♯ ♪ ♫ ♬ ♭ ♮ ♯ ♪ ♫ ♬ ♭ ♮ ♯ |
 ♪ ♫ ♬ ♭ ♮ ♯ ♪ ♫ ♬ ♭ ♮ ♯ ♪ ♫ ♬ ♭ ♮ ♯ |
 ♩ ♩ ♩ ♩ ♩ ♩ ♩ ♩ ♩ ♩ ♩ ♩ ♩ ♩ ♩ ♩ ♩ ♩ ♩ |

p. 239, §152.a.viii, Example 1: Replace the braille with the following:

EXERCISE 13 (pp.241+)

#28 and #29: Each arrow infinity modifying "lim" should be centered on the "n" as follows:

$$n \rightarrow \infty$$

#40: The mathematical expression (second print line) should be indented more to the right to indicate it is displayed to the itemized material.

#47: The mathematical expression (second print line) should be moved up to follow immediately after the first line of print (on the same line). This is not a displayed expression; it is a continuation of the sentence; the sentence ends with a question mark.

LESSON 14

p. 248, §155.a.iv, Example 20: There should be no vinculum on the radical sign. Print should read:

✓ four *Simbraille is correct.*

p. 248, §155.a.v: Replace the narrative with the following:

v. Contractions must not be used in a capitalized or uncapitalized word, part of a word, or abbreviation immediately preceding or following a sign of comparison (or an omission symbol representing a comparison sign), even when a space separates the sign of comparison from the word, part word, or abbreviation.

p. 252, §155.b.v, Example 4: The "ch" in the word "Change" should not be contracted because it precedes a sign of comparison. The word "in" should not be contracted following the less-than symbol. Replace the braille with the following:

p. 253, §155b.v

Example 11: In the braille, there should be no space between the closing parenthesis and the "dx". Replace the braille with the following:

(11) 

Example 12: The usual print representation of tally marks is a series of vertical (not oblique) lines. Replace the print with:

(12) The numeral 3 is represented by |||.

p. 253, 155.b.vii

In the print, delete the period at the end of the sentence and add:

consisting of one letter or a combination of letters corresponding to a short-form word.

Example 1: In the braille “into” should be contracted and moved to eliminate the space before “lbs.” Replace the braille with the following:

(1)     

Example 2: There should be no punctuation indicator between the "m" and the period.
Replace the braille with the following:

p. 254, §155.b.viii, Example 4: The “ch” in the word “Change” should not be contracted before the greater-than symbol. Replace the braille with the following:

p. 255, §155.c, Example 4: Replace the braille with the following:

(4)

p. 255, §155.c, Example 5: Replace the print and the simbraille with the following:

- (5) We know that $<$ means "is less than".

(The configuration of dots for "know" correspond to the comparison sign.)

p. 259, §157.b, Example 3: The braille must show an additional runover immediately preceding the multiplication cross symbol in the first link. Replace the braille with the following:

- (3) 3 6 3 6 3 6 3 6 3 6 3 6 3 6 3 6
 3 6 3 6 3 6 3 6 3 6 3 6 3 6 3 6
 3 6 3 6 3 6 3 6
 3 6 3 6 3 6 3 6
 3 6 3 6
 3 6 3 6 3 6 3 6 3 6 3 6 3 6 3 6 3 6
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 3 6 3 6 3 6 3 6 3 6 3 6 3 6 3 6 3 6 3 6
 3 6 3 6
 3 6 3 6 3 6 3 6 3 6 3 6 3 6 3 6 3 6 3 6
 3 6 3 6

p. 262, §157.c, Example 3: The braille should be corrected as shown below:

p. 263, §157.c, Example 4: The braille should be corrected as shown below:

EXERCISE 14 (pp.264+)

#7: There is only one minus sign preceding the word "cosine."

#9: The "i" and "t" are transposed in "multiplier." Change the print copy to show the correct spelling.

LESSON 15

p. 267, §158: The print should read as follows:

§158. Spatial Arrangements: Spatial arrangement is required with material arrayed on more than one line in print, as in addition, subtraction, multiplication, division, determinants, matrices, and systems of equations. A matrix consisting of only one row is also arranged spatially.

p. 269, §161.b, Example 4: The print arrangement should be moved to the right to show it is displayed. Replace the braille with the following:

p. 269, §161.c: Replace the text with the following.

c. The plus, minus, or currency symbols, if the corresponding signs are present, must be placed at least one column of cells to the left of the widest column of numeric symbols which appears in the part of the arrangement *above* the separation line. Subject to this requirement, a symbol of operation or a currency symbol may be placed in the same position as shown in print. If there is an answer, part of it may be shown beneath the plus, minus, or currency symbol.

p. 288, §164.a: In the print, second line, third word, change the word "divisor" to "dividend."

p. 292, §164.c, Example 2: There should be no comma on the third line of print. It should be "135" Simhraille is correct

p. 296, §164.f: Delete the first sentence and replace it with the following:

Print does not have a standard layout for carried numbers in a division arrangement. When carried numbers are shown, regardless of print placement it is suggested that the transcriber arrange the carried numbers below the carried number indicator and to the left of the dividend digits to which they apply. A transcriber's note describing both the print and braille formats must be included.

Retain the final two sentences.

p. 296, §164.g: Replace the text with the following:

g. If the division arrangement shows only a divisor and a dividend but no quotient and no partial products and differences, and if the divisor and dividend are composed entirely of numerals with or without decimal points and/or commas, the arrangement must not be regarded as spatial. The separation line must be omitted, a blank line must not be left above or below such a division arrangement, and the numeric indicator must be used where required according to other rules of the code.

p. 303, §168.e, Example 1: In the simbraille there should be no space between the star and the "4" because the star is a reference symbol in this example. Replace the braille for the ⠠⠄⠄ with the following:

卷之三

p. 303, §168.f, Example 1: Replace the braille with the following:

Diagram (1) consists of a 3x3 grid of dots. The top row has three pairs of dots: the first pair is a vertical pair, the second is a horizontal pair, and the third is a vertical pair. The middle row has two pairs of dots: the first is a horizontal pair and the second is a vertical pair. The bottom row has three pairs of dots: the first is a horizontal pair, the second is a vertical pair, and the third is a horizontal pair.

p. 304, §169: Replace the text as follows:

§169. Margins for Instructions Preceding Itemized Spatial Arrangements:

When spatially arranged itemized material is preceded by instructions, the instructions must begin in cell 5, and runovers must begin in cell 3. One line must be left blank above such instructions unless they follow a cell-5 heading. Follow the most recent revision of *Braille Formats: Principles of Print to Braille Transcription* for spacing following a page-change line. One blank line must be left between the instructions and the spatial arrangement below them. The last line of an instruction and the spatial arrangement below it must be on the same braille page.

p. 304, §170, Example 2: The "62" should be deleted from the lower right corner of the *print* example. (Do not erase the braille page number ⠼⠃⠃⠼⠃⠃ in the simbraille.)

p. 305, §171: Add a final sentence to the paragraph as follows:

Spatial itemized material may be transcribed using the same margin rules as are used for non-spatial itemized material.

p. 305, §172.b, Example 1: The "10" should be deleted from the lower right corner of the print example. (Do not erase the braille page number ⠼⠃⠚⠚ in the simbraille on page 306.)

LESSON 16

p. 310, §175, Example 1: Correct the following in the print: The dividend should have an additional zero: 51000 and the quotient should be arranged so the numerals 7 8 and 4 are directly above the three zeros in the dividend. Replace the braille with the following:

A large grid of Braille characters arranged in a pattern that forms the number 1. The grid consists of approximately 100 cells, with the central cell containing a single dot representing the digit 1. The surrounding cells are empty, creating a clear visual representation of the number.

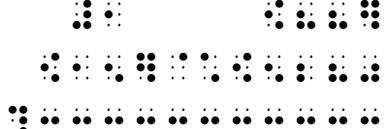
p. 311, §176

In the second from the last line, delete the words “should not be shown spatially” and replace them with “should be transcribed linearly”. Then add the following:

Terms of the fraction must be centered above or below their fraction lines.
The result of cancellation must be centered with respect to the canceled term.

Example 1: Replace the braille with the following:

p. 311, §176, Example 3: Replace the braille with the following:

(3) 

p. 313, §178.b, Example 1: Replace the braille with the following:

A large grid of Braille characters, likely a sample of the Braille code. The grid consists of approximately 10 columns and 10 rows of Braille dots. Each dot is a small circle, and they are arranged in a specific pattern to represent letters or numbers. The grid is centered on the page.

p. 314, §178.b, Example 2: Replace the braille with the following:

p. 314, §179: Add the following text:

Each numerator must be centered with respect to the fraction line below it.

p. 316, §181.a: Replace the last sentence with the following:

Identifiers, comparison symbols, symbols of operation, punctuation, and other applicable symbols—if they appear outside of, and on the same side of the expression as, the enlarged grouping symbol—must be placed on the top line of the arrangement, even if centered in print.

p. 317, §181.c.

Replace the text with the following:

c. Ununified Systems of Equations: When a system of equations is arranged on two or more lines and is not joined by any sign of grouping, the arrangement is considered to be spatial and blank lines must be left above and below it.

p. 317, §181.c, Example 1: Replace the braille with the following:

The image shows a 4x5 grid of Braille characters. The first row contains the characters 'H E L L O'. The second row contains 'E L L O'. The third row contains 'L L O'. The fourth row contains 'L O'. The characters are arranged in a grid pattern with vertical columns and horizontal rows.

p. 318, §181.c, Example 2: Replace the braille with the following:

The image shows a musical score for two staves. The top staff begins with a treble clef, a common time signature, and a key signature of one sharp. It contains a series of eighth notes. The bottom staff begins with a treble clef, a common time signature, and a key signature of one sharp. It also contains a series of eighth notes. Both staves have a consistent tempo and rhythm throughout the visible portion.

p. 318, §182

Add the following sentence to the end of the text paragraph:

The entire arrangement is considered spatial and blank lines must be left above and below it.

Example 1 : Add numeric indicators as shown in the braille below:

Example 2: Add numeric indicators as shown in the braille below:

p. 319, §183.a: Replace the text with the following:

a. Determinants and matrices, including those with only one row, are spatial arrangements. Thus, a line must be left above and below each determinant or matrix. In a determinant or matrix that appears on more than one line of braille, at least one enlarged grouping symbol must appear on each braille line. However, when a determinant or matrix appears on only one line in braille, a regular, not enlarged grouping symbol is used.

p. 319, §183.b: Add this sentence to the beginning of the text paragraph:

Each entry must be moved as far up as possible in the row to which it applies.

Add to the end of the paragraph:

Centering and other forms of alignment are not permitted.

p. 323, §183.h.iv, Example 1: In the print example, the first entry in the last row, there should be no space between the "3" and the "e."

$$3e^{2x}$$

In the braille example, the first entry in the last row

⋮ ⋮ ⋮ ⋮ ⋮ ⋮

should be placed on the braille line above its present position, as shown below:

A row of Braille labels for a 4x4 grid of small containers. The labels are arranged in a single horizontal row. From left to right, they are: "11", "12", "13", "14", "21", "22", "23", "24", "31", "32", "33", "34", "41", "42", "43", and "44". Each label consists of two Braille characters.

TABLES

p. 324, §184.c.

Add the following text to the end of the paragraph:

If guide dots are needed within any column, the numeric indicator is required for all numeric entries.

Example 1: Replace the braille table with the following:

Example 2: Replace the braille table with the following:

p. 324, §185: Add this phrase to the end of the first sentence:

except for the coordinate labels in number lines.

pp. 325+, §186: The rules for keying presented in the instruction manual are obsolete. Delete the text of the current a., b., and c. Follow the provisions of the most recent revision of *Braille Formats: Principles of Print to Braille Transcription* and the BANA 2011 Nemeth Updates (Replacement Section 187) for keying rules. Sections a-f of the Update are reproduced below. The updated Example 1 for the Nemeth codebook is posted on the BANA website. The updated examples for the lesson manual are printed below.

KEYING

§186. Keying: A numeric or alphabetic key may be substituted where there is not enough space for determinants, matrices, column headings, table entries, figure labels, etc.

- a. When space does not permit the inclusion of labels, headings, entries, etc., in a figure, determinant, matrix, or table as shown in ink print, one or more of the labels, headings, entries, etc., may be replaced by a numeric or alphabetic key. Two items which are identical should have the same key assigned to them.
- b. A numeric key should consist of one or more numerals brailled in the upper part of the braille cell. This number must be preceded by the numeric indicator and must not be punctuated. Numbered keys should be listed in numeric order. These numbers should be placed in the figure, determinant, matrix, or table in the same position as the material which they replace.
- c. An alphabetic key must consist of two lower-case English letters, one of which contains a dot 3 or dot 6, and, if possible, the combination should be suggestive of the item it represents. Contractions and letter combinations that correspond to short form words may not be used. An alphabetic key may not be used if any of the print entries in the table are made up of two lower case letters. In that case, a numeric key must be used.
- d. A list of numeric and/or alphabetic keys and their meanings must be included in a transcriber's note as described in the most recent revision of *Braille Formats: Principles of Print to Braille Transcription*.
- e. **Tables, Lists, Columned Material:** Subject to the provisions of §17, §30, §188 [of the Nemeth Code], and the above, tables, lists and columned material must be transcribed in accordance with the provisions of the most recent revision of *Braille Formats: Principles of Print to Braille Transcription*.
- f. **Figures:** Subject to the provisions of §17, §30 [of the Nemeth Code], and the above, figures must be produced in accordance with the provisions of the *BANA Guidelines and Standards for Tactile Graphics, 2010*.

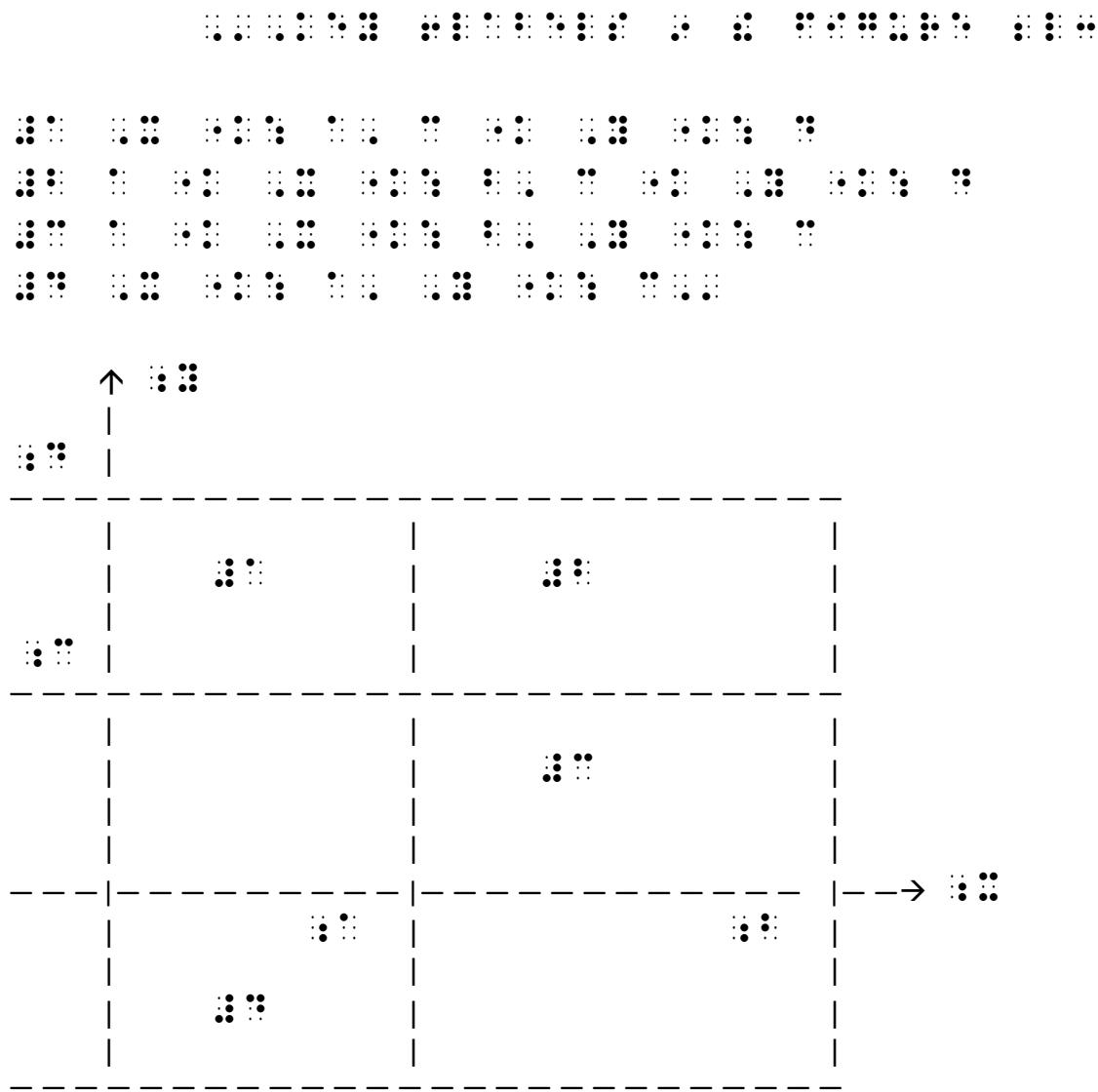
p. 326, Example 1: Replace the braille table with the following:

p. 327, Example 2: In print, second column, fourth row: add a comma after the closing parenthesis.
Print will now read: $t(1, 1)$, $t \neq 0$ Replace the braille with the following:

J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z	
J		K																															

p. 328, Example 3:

A comma and a space have been omitted. Print should read as follows: $X \leq a, c < Y \leq d$
Replace the braille table on page 329 with the following:



p. 330, §187, Example 1: Add a period following the print word "Solve". *Simbraille on page 331 is correct.*

EXERCISE 16 (pp.332+)

#s 7, 8, 9: These mathematical expressions should be indented more to show they are displayed expressions.

#13: The second line of the displayed expression should show a comma, not a plus sign, in the expression, like this:

$$(0, 0) + (v_1, v_2) = \dots$$

After page 334, insert the following:

FINAL WORD

This completes the coursework. *The Nemeth Braille Code For Mathematics and Science Notation, 1972 Revision*, should now become your primary source reference for technical materials. Subject matter from several lessons may be grouped into one section in the codebook, giving new perspective and understanding of the rules. Appendix B offers a useful index of braille symbols. The Index will help you learn the vocabulary used in this work.

Updates to our source books, including *English Braille American Edition* and *Braille Formats*, have applicability to your Nemeth certification exam and any work you will be doing after certification. Once approved, errata and addenda to the codebooks are posted on the BANA website.

How to download the BANA Updates and additional materials

- Go to www.brailleauthority.org
- Click on "Codebooks and Guidelines" and then on "Mathematics and Science Braille"
- Scroll down to the heading **Updates**
- Each document is listed by the year which it was posted. Click on the format you prefer (pdf, html, or brf) to download each document. You can save the document on your computer and/or print a copy.
- Also find the document titled "*Application of the Formats Guidelines to Nemeth Transcriptions*" on the Braille Formats page by returning to the "Codebooks and Guidelines" screen and clicking on "Braille Formats"

Keep all of your resources up-to-date by visiting the other links to Literary Braille, Braille Formats, Computer Braille, and Tactile Graphics. All codes have applicability in our work.

Periodically, new updates are added to the BANA site. It is your responsibility to check back occasionally for further updates. You can join the BANA contact list by clicking on "Contact Us" and then follow the instructions under the heading **Sign up for BANA-announce Listserv**.

Watch for a posting in May of 2014 when the Nemeth code updates will be offered altogether in one file for insertion into your codebook.