

# Corrections made in Second Printing of *An Introduction to Symbolic Dynamics and Coding*

July 9, 2012

The Second Printing has given us the chance to correct a number of typographical errors in the First Printing, fix two proofs, add some clarifications, delete an incorrect part of an exercise, and highlight the solution by Kim and Roush of the Shift Equivalence Problem. The following is a complete list of all changes made in the Second Printing.

## Errata corrected in Second Printing

Page 13, proof of Proposition 1.4.3, each occurrence of  $\mathcal{A}_X^{[N]}$  was replaced by  $\mathcal{A}^N$ .

Page 57, 5th line from bottom, “is an out-splitting” changed to “in an out-splitting”.

Page 74, first paragraph replaced by the following:

“To prove the reverse inclusion, let  $u \in \mathcal{B}(X)$ . By iteratively applying Proposition 1.3.4(1)(b), there is a word  $w$  with  $wu \in \mathcal{B}(X)$  and  $|w| > |\mathcal{V}(G)|$ . By definition of  $\mathcal{G}$ , there is a path in  $G$  labeled by  $wu$ . Such a path can be written  $\alpha\beta\gamma\pi$ , where  $\beta$  is a cycle and  $\pi$  is labeled by  $u$ . Since every state of  $G$  has at least one outgoing edge, it follows that  $\pi$  can be extended to a bi-infinite path in  $G$ , and so  $u$  belongs to  $\mathcal{B}(X_{\mathcal{G}})$ .”

Page 85, Exercise 3.3.4, deleted second occurrence of “Let  $X$  be an irreducible sofic shift.”

Page 88, 9th line from bottom, deleted “=  $\mathcal{L}_1 \times \mathcal{L}_2$ ”.

Page 110, 8th line from bottom, changed “multiple of  $\lambda$ ” to “multiple of  $\mathbf{v}$ ”.

Page 140, last line, changed  $d_D$  to  $f_D$ .

Page 219, statement of Lemma 7.1.3, changed “where  $\tilde{\phi}^{-1}$  has memory  $m$  and anticipation  $n - 1$ ” to “where  $\tilde{\phi}$  is a 1-block code whose inverse has memory  $m$  and anticipation  $n - 1$ ”.

Page 220, first line, after  $\psi_j$  added “out-amalgamation codes  $\alpha_j$ ”. Second paragraph, line 3, after  $\psi_{n+k}$  added “in-amalgamation codes  $\alpha_{n+k}$ ”.

Page 240, replaced material starting “Kim and Roush ...” through the end of Problem 7.3.14 with:

“This problem, known as the *Shift Equivalence Problem*, was open for more than twenty years. Kim and Roush [KimR12] recently solved the Shift Equivalence Problem in the negative by constructing two irreducible shifts of finite type that are shift equivalent but not strong shift equivalent. Earlier they had found a reducible example [KimR11]. Their solution depends on a new invariant called the sign-gyration homomorphism that they developed in collaboration with Wagoner [KimRW1], and whose origins can be traced back to the work of Boyle and Krieger [BoyK1].”

Page 259, line 9, replaced parenthetical remark with “and for irreducible shifts of finite type [KimR12]”.

Page 262, Notes, replaced sentence starting “While shift equivalence ...” with:

“Using work of Boyle and Krieger [BoyK1], Wagoner [Wag6], as well as [KimRW1] and [KimRW2], Kim and Roush [KimR12] showed that shift equivalence does not imply strong shift equivalence even for irreducible matrices. However, in other settings it does.”

Page 263, At the end of Notes section, added “Exercise 7.5.11(a) comes from [BoyK2]”.

Page 362, first displayed equation, replaced “ $\tilde{\phi}_{[i,j]}(x)$ ” with “ $\tilde{\phi}(x)_{[i,j]}$ ”.

Page 379, line 16, replaced “Since any power” with “Since any power  $\geq 5$ ”.

Page 391, deleted the next to last paragraph.

Page 395, Exercise 11.2.8, deleted “but that it can be realized as the nonzero spectrum of a  $3 \times 3$  primitive integral matrix”.

Page 414, line 20, after “equivalent” added “via elementary operations.”

Page 441, lines 11-13, replaced the parenthetical remark with “(later they showed how to find examples of irreducible matrices with the same property [KimR12])”.

Page 479, added reference [KimR12] K. H. Kim and F. W. Roush, *Williams’ conjecture is false for irreducible subshifts*, Annals of Math. (to appear).