

**Errata, Corrections, and Additions
to INVITATION TO ERGODIC
THEORY**

C. E. Silva

Acknowledgements I would like to thank the following people of comments and corrections: Zhou Fan, Markus Haase, Russell Hendel, Jessica Lin, Zbigniew Lipecki, Jillian McLeod, Mihai Stoiciu, Enrico Zoli.

Line numbers start counting from the first line right after the underlined title on each page.

Page 13, line 11 I_0 *should be* X_0

Page 29, line -4 **canonical atomic spaces** *should be* **canonical atomic Lebesgue spaces**

Page 30, line 6 the points x_i *should be* the points k

Page 45, line 5 $< \varepsilon$ *should be* $< \frac{\varepsilon}{2k}$

Page 45, line 9 if and only if *should be* then

Page 64, line 11 $\lambda(L \cap A)$ *should be* $\lambda(L)\lambda(A)$

Page 81, line -3 $f(x) = x^2$ *should be* $f(x) = 4x(1 - x)$

Page 83, line -12 a σ -finite *should be* a complete σ -finite

Page 88, line -4 A set *should be* A measurable set

Page 92, line -14 A set *should be* A measurable set

Page 94, line -17 *Exercises 3.6.2 and 3.6.3 are the same as Exercises 3.4.4 and 3.4.5*

Page 99, line 9 a nonatomic measure space *should be* a measure space

Page 107, line -9 are *should be* is

Page 117, line 7 $|\phi(x) - \phi(y)|$ *should be* $\lambda(F) |\phi(x) - \phi(y)|$

Page 117, line 7 $[0, x_0)$ *should be* $[0, y)$

Page 119, line 10 $A \in \mathcal{S}'(X'_0)$ if and only if $\phi^{-1}(A) \in \mathcal{S}(X_0)$, *should be* $\phi^{-1}(A) \in \mathcal{S}(X_0)$,

Page 119, line 12 *After line 12 add:*

$$(3) \phi(T(x)) = T'(\phi(x)) \text{ for all } x \in X_0.$$

Page 119, line -4 Let $T : (X, \mu) \rightarrow (Y, \nu)$ and $\phi : X \rightarrow Y$ *should be* Let $\phi : (X, \mu) \rightarrow (Y, \nu)$

Page 122, line 4 $\mu(B \cap A_i)$ *should be* $(B \cap A_i)$

Page 137, line -4 two functions *should be* two measurable functions

Page 149, line -6 transformation T is *should be* transformation T on a σ -finite measure space is

Page 153, line 2 (*two instances of:*) (a, b) *should be* $[a, b)$

Page 153, line 3 $y \in (0, 1)$, *should be*

$$y \in (0, 1), \nu(T^{-1}[0, y)) = \nu[0, y).$$

Page 153, line 4

$$\nu(T^{-1}[0, y)) = \nu[0, y) = \frac{1}{2} \int_{[0, y)} \frac{1}{1+x} d\lambda(x)$$

should be

$$\text{Now, } \nu[0, y) = \frac{1}{\ln 2} \int_{[0, y)} \frac{1}{1+x} d\lambda(x)$$

Page 153, line 5 $\frac{1}{2}$ *should be* $\frac{1}{\ln 2}$

Page 153, line 6 $\frac{1}{2}$ *should be* $\frac{1}{\ln 2}$

Page 159, line -8 all functions *should be* all measurable functions

Page 165, line 9 Lebesgue space *should be* measure space

Page 178, line -5 a measurable function *should be* a function (*while only used for measurable functions measurability is not needed in the proof*)

Page 178, line -3 *At the end of the line add:* for all $x \in X$

Page 178, line -1 *At the end of the line add:* for all $x \in X$

Page 179, line -8 a measurable function *should be* an integrable function

Page 193, line -16

$$\frac{1}{n} \text{ *should be* } 2^n$$

Page 193, line -14

$$\|f_n - 0\|_p = \|f_n\| \text{ *should be* } \|f_n - 0\|_p^p = \|f_n\|_p^p$$

Page 194, line 7

$$\|g_i\|_p = \lambda(K_i) \text{ *should be* } \|g_i\|_p^p = \lambda(K_i)$$

-
- Page 195, line 7** $g \in L^2$ *should be* $g \in S$
Page 195, line 9 transformation *should be* projection
Page 195, line -15 $g \in L^2$ *should be* $g \in S$
Page 195, line -2 T *should be* T^i
Page 197, line 7 (h, h_k) *should be* $(h - h_k, f)$
Page 198, line -10 T *should be* T^i
Page 199, line 4 T *should be* T^i
Page 209, line -8 a probability space *should be* a measure space
Page 214, line 5 a countable sufficient *should be* a sufficient
Page 230, line -8 simples *should be* simpler
Page 253, line -16 [13] is weakly mixing *should be* [19] is weakly mixing

Additions

(1) E. Zoli suggests another proof for Lemma 3.7.3. We have changed notation somewhat to emphasize that the lemma holds in a measure space.

Lemma 3.7.3 1. *Let (X, \mathcal{S}, μ) be a measure space with a sufficient semi-ring \mathcal{C} . If $A \in \mathcal{S}$ is of finite positive measure, then for any $\delta > 0$ there exists $I \in \mathcal{C}$ such that I is $(1 - \delta)$ -full of A .*

Proof. We show the contrapositive. Let A be a measurable set and suppose that there is a constant $0 < c < 1$ such that

$$\mu(A \cap I) \leq c \mu(I)$$

for all I belonging to the sufficient semi-ring \mathcal{C} . Then, if $\{I_n\}$ is a sequence of elements of \mathcal{C} such that $A \subset \bigcup_{n=1}^{\infty} I_n$, by hypothesis and by countable subadditivity,

$$\mu(A) \leq \sum_{n=1}^{\infty} \mu(A \cap I_n) \leq c \sum_{n=1}^{\infty} \mu(I_n).$$

As the sequence $\{I_n\}$ is arbitrary and \mathcal{C} is a sufficient semi-ring, taking the infimum we obtain $\mu(A) \leq c\mu(A)$. Then, as $c < 1$, $\mu(A) = \infty$ or $\mu(A) = 0$. \square

(2) Z. Lipecki points out that a shorter proof of Proposition B.1.8 can be found in W. Rudin, *Amer. Math. Monthly* 90, 41-42, 1983.