Corrections and Comments on *Probability and Information, second edition*

P33, Example 3.6 ”it is easy to see that” is somewhat misleading. A mathematical proof is not being asked for here. Despite its apparent simplicity, Lebesgue measure is highly non-trivial and in advanced courses on measure theory, proving that it really is a measure takes some doing. At this level, its sufficient to convince yourself that the length of two or more disjoint intervals should be the sum of the lengths of the individual ones, e.g. by drawing a picture or just thinking about it.

P40, Exercise 3.18. If you define $m * n$ in this way it turns out not be a measure, but if you replace $A\backslash B$ with $A - B$ then everything works fine.

P.59, line 3. “sufficient” should read “insufficient”.

P59, Example 4.9. I now think that the reasoning used to argue that all three hypotheses are equally likely is faulty. If you label the balls 1 and 2 (say) then there are four possibilities: Ball 1 and Ball 2 both black, Ball 1 black and Ball 2 white, Ball 1 white and Ball 2 black and Balls 1 and 2 both white. The ‘principle of insufficient reason’ assigns each of these events equal probability and the upshot is that

$$P(H_1) = P(H_3) = \frac{1}{4}, P(H_2) = \frac{1}{2}.$$

Bayes’ theorem now yields $P_{2W}(H_1) = \frac{2}{3}$ and $P_{2W}(H_2) = \frac{1}{3}$ so we conclude that $P_{2W}(W_3) = \frac{5}{6}$ which is smaller than the result in the book by $\frac{1}{15}$.

P81, line 6, The square should be inside the second bracket, i.e. $\mathrm{Var}(X) = \mathbb{E}((X - \mu)^2)$.

P85, 1st line, change $c \in \mathbb{R}$ to $t \in \mathbb{R}$.

P85, +6 insert “(where $a > 0$)” after “for all t.”

p85, 13 lines from bottom. The definition of *nondegeneracy* given here is too restrictive. It should read that for all $1 \leq j \leq n$ (and assuming $n \leq m$) there exists $1 \leq k \leq m$ such that $p_{jk} > 0$. If $n > m$ then swap the roles of j and k.

P87, lines 12 and 14, In the solution to Example 5.11, subscripts 1 and 2 should be changed to 0 and 1 (respectively).

P88, 15 lines from bottom. Exercise 5.11(c) should be Exercise 5.11(i)

p.92, Formula (5.10) should be for $0 \leq r \leq n$, and not $1 \leq r \leq n$.

P94, line after (5.12). The range should be $\mathbb{N} \cup \{0\}$.

P111, 4 lines up. The reference should be to page 87, not pages 76-7 (that was the first edition).

P131, 13 lines up. It should be $p_{10} = p\epsilon, p_{11} = p(1-\epsilon)$. This does not change the calculation of $H_S(R)$ below.

P143, 8 lines up. This is not Exercise 7.17. In fact, this should be interpreted as a missing Exercise 7.19 and a hint for the solution is given under 19 on p.264. But you do need to assume a uniform distribution on the set of codewords.

p157, 14 lines up, $p_X(x,y)$ should be $p_X((x,y))$ in line with earlier notation.

P164, 12 lines up - (5.16) should be (5.6).

165, 13 lines down $c \geq 0$ should be $c > 0$.

170, last line, ∞ in the lower limit of the integral should be $-\infty$. See also p.174, third line.

172, 13 lines up "next chapter" should be "next section".

176, line 11 $\lim_{n\to\infty} p$ should be $\lim_{n\to\infty} P$.

P181, 8 lines up. α instead of ∞ has been typed in the integral (twice).

p196, two lines up. Change Exercise 9.15 to Exercise 9.16.

P201, 1 line up. Y should be B.

P203, 9 lines from the top. $h_2(x)$ should be $h_2(y)$.

P205, bottom line. The numerator is incorrect and the correct formula is:

$$f_{Y_x} = \frac{1+4x^2y}{1+4x}$$

P208, Lines 3 and 4, Replace $A - \{x\}$ with $A - x := \{y - x, y \in A\}$.

p210, 15 lines down, replace Exercise 9.17 with Example 9.14.

P213, Ex 9.14. Replace $\mathbb{N}^2$ with $(\mathbb{N} \cup \{0\})^2$.

P214, Exercise 9.20. Change "by (5.8))" to "(5.8))."

P264. There are solutions (20) and (22) to problems that don't appear in the book - but watch this space as I may yet set them!

P265. Problem 8.33. I'm now somewhat dubious that this approach works. The following does though: Since $\lim_{n\to\infty} \alpha(n) = 0$, given any $\epsilon > 0$, there exists N such that whenever $n > N, -\epsilon < \alpha(n) < \epsilon$, and so

$$\left(1 + \frac{y-\epsilon}{n}\right)^n < \left(1 + \frac{y+\alpha(n)}{n}\right)^n < \left(1 + \frac{y+\epsilon}{n}\right)^n.$$

Now take limits as $n \to \infty$, to get

$$e^{y-\epsilon} \leq \lim_{n\to\infty} \left(1 + \frac{y+\alpha(n)}{n}\right)^n \leq e^{y+\epsilon}.$$

Finally, take the limit on both sides of the inequality as $\epsilon \to 0$, and the result follows.

Thanks are due to John Haigh of Sussex University and to Mark Millard who were the first to spot many of these errors.

Dave Applebaum, March 2010