Errata for Second Edition

January 14, 2017

1 Distributions, Moments, and VaR

1. In Definition 1.7, for the continuous distribution $F_Y(y)$ should be defined as:

$$F_Y(y) = \begin{cases} 0 & y < a \\ \frac{y-a}{b-a} & a \le y \le b \\ 1 & y > b \end{cases}$$

2. In Example 1.8, we should have $f_Y(y) = \frac{1}{3}$ so

$$Pr(2 \le Y \le 4) = \int_2^4 \frac{1}{3} dy = 2/3$$

3. In Example 1.13, Distribution 3 is actually Unif($\{1, 3, 5\}$).

2 Actuarial Models, Mixtures and Risk

1. Example 2.2 should show "$F_Y(y) = 1 - e^{-y/(c\theta)}$" in two places as opposed to "$F_Y(y) = 1 - e^{-x/(c\theta)}$".

3 Continuous Models

1. In the end-of-chapter problems and solutions, the following changes are made:
   - Problem 2: θ follows an exponential(1) distribution.
   - Solution to Problem 2: $F(x|\theta) = 1 - e^{-\theta x}$ and $F(x|\lambda) = 1 - e^{-x/\lambda}$.
   - Solution to Problem 11: We should have $A(t) = \int_0^t wx^{w-1}dx = t^w$, which results in a final answer of $S(3) = 0.5247$.

5 Insurance Coverage Modifications

1. Before Theorem 5.16, the coinsurance symbol should be α instead of a.
2. Theorem 5.9, Theorem 5.12, and Theorem 5.16 should read "inflation r" instead of "inflation $1 + r$".
3. In the end-of-chapter problems and solutions, the following changes are made:
   - Problem 10: The maximum covered loss (not policy limit) is $30,000$.
   - Solution to Problem 4: For an ordinary deductible, $E(Y^L) = \int_d^\infty (x - d)f(x)dx = 7421.95$, resulting in $E(Y^P) = 20,000$. The same quantities for a franchise deductible are then 7978.59 and $21,500$.
   - Solution to Problem 11: The expected cost per payment should be written as $E(Y^P) = \frac{6269}{1-F_X(\frac{5000}{1.05^3})}$. The final answer remains correct as is.

6 Aggregate Loss Models

1. In Theorem 6.11, s_j should be S_j.
2. In Example 6.20, we should have $E[(S-100)_+] = 40$ and $E[(S-200)_+] = 20$. Carrying through the calculation with these new numbers should produce an answer of 28.

7 Mathematical Statistics

1. In Example 7.4, we could also conclude $\lim_{n\to\infty} \frac{n\theta}{n+1} = \theta$ based on dividing both numerator and denominator by n.

8 Analyzing Complete Data

1. In Example 8.10, the expressions for $F_n(x)$ and $f_n(x)$ should be defined over intervals that are in the form of $a \le x < b$, not $a \le x \le b$.
2. In the last paragraph before the start of the problems, $F(X)$ should be replaced by $F(x)$.

9 Analyzing Modified Data

1. In paragraph after Example 9.3, r_j is the number of people at risk at time y_j.
2. To be more consistent with the accompanying formula, the verbal definition of (9.1) should read

   r_j = those who died on or after y_j + those censored on or after y_j − those who haven't entered before y_j

3. Definition 9.8 should end before the estimators are introduced.
4. In Section 9.4, our general instructions are for the construction of a $100(1-\alpha)\%$ confidence interval, not a $100\alpha\%$ interval and not necessarily restricted to a 95% confidence interval.
5. In the end-of-chapter problem solutions, Problem 15 should have a $r_3 = 19 - 1 - 2 = 16$ and $r_4 = 16 - 1 - 0 = 15$. Aside from these minor changes in the table, the subsequent calculations are correct in a)-f).

10 Kernel Density Estimator

1. In the solution for end-of-chapter Problem 2, we should have $\theta = y_j(\alpha - 1)$. The final answer should then be

$$K_{y_j}(x) = 1 - \left(\frac{y_j(\alpha-1)}{x + y_j(\alpha-1)}\right)^{\alpha}$$

11 Parametric Estimation

1. In Section 11.2, right after the 2-steps required to interpolate for a percentile matching estimate, we give a quick example where we should have written $j = \lfloor (20+1)\cdot 0.5 \rfloor = \lfloor 10.5 \rfloor = 10$ instead of $j = \lfloor (20+1)\cdot 5 \rfloor = \lfloor 10.5 \rfloor = 10$.
2. In Example 11.17, the following changes are to be made:
   (a) The second equation in Method 1 should be: $L(\theta) = \prod_{i=1}^{n} \frac{e^{-x_i/\theta}}{\theta} = \frac{e^{-\sum x_i/\theta}}{\theta^n}$.

(b) The first equation in Method 2 should be: $L(\theta) = \frac{e^{\frac{-x_i}{\theta}}}{\theta} \Rightarrow l(\theta) = -\frac{x_i}{\theta} - \ln\theta$. The second set of equations should read:

$$\begin{aligned} -E\left[\frac{\partial^2 l}{\partial\theta^2}\right] &= -\left[-\frac{E(2X_i)}{\theta^3} + E(\frac{1}{\theta^2})\right] \\ &= -\left[-\frac{2\theta}{\theta^3} + \frac{1}{\theta^2}\right] \\ &= \frac{1}{\theta^2} \end{aligned}$$

(c) The first equation in Method 3 should be: $L(\theta) = \prod_{i=1}^n \frac{e^{-x_i/\theta}}{\theta} = \frac{e^{-\sum x_i/\theta}}{\theta^n}$. All similar occurrences of the double summation in $E(\sum X_i^2 + \sum_{i=1}^n \sum_{j=1}^n X_i X_j)$ should be similarly corrected to exclude the terms where $i \neq j$. The final equation in the example should be: $\frac{1}{\theta^4}E[(\sum X_i)^2] - \frac{n^2}{\theta^2} = \frac{2n}{\theta^2} + \frac{n^2}{\theta^2} - \frac{n}{\theta^2} - \frac{n^2}{\theta^2} = \frac{n}{\theta^2}$. All single summations should be $\sum_{i=1}^n$ and all double summations should be $\sum_{i=1}^n \sum_{j\neq i}$

3. The summations in the first two equations under Section 11.3.1 should be iterating over j rather than i.

4. In the opening "Remark" under Section 11.4.2, the correct statement of the Cramer-Rao inequality should read "under appropriate regularity conditions, no unbiased estimator has a variance smaller than $1/I(\theta)$". The current statement might be mistakenly interpreted as the variance must be smaller than *the variance of* $1/I(\theta)$.

5. The second equation in Section 11.4.2 should be:

$$(I(\theta))_{ij} = -E\left[\frac{\partial^2 l(\theta|x)}{\partial\theta_i \partial\theta_j}\right]$$

6. Below the second remark under Section 11.4.2, the explanation of the equation should read "where $[I(\theta)]_{ii}^{-1}$ is the (i,i)-th element in the inverse of the information matrix $I(\theta)$.".

12 Bayesian Estimation

1. In Example 12.14, the exponential distribution should have PDF $f(x) = \lambda e^{-\lambda x}$.

13 Model Selection

1. In the alternative statement of the Kolmogorov-Smirnov test statistic in Section 13.4.1, we should have

$$D = \max_{t \le x \le u} \{|F_n(x-) - F^*(x)|, |F_n(x) - F^*(x)|\}$$

The current printing included two occurrences of the word "max".

14 Simulation

1. In Example 14.2 and Example 14.4, we should have $F_S(s)$ defined on intervals of s rather than x.

2. Section 14.2.2 has the change given here `http://actempire.com/wp-content/uploads/2013/03/250PageReplacement.pdf`.

3. Example 14.10 should include a final line: Thus, $\widehat{VaR}_{0.8}(x) + \widehat{TVaR}_{0.8}(x) = 34 + 36 = 70$.

4. Some of the end of section problems has been changed here `http://actempire.com/wp-content/uploads/2013/03/Solutions10-12Chpt14.pdf`.

16 Bayesian Credibility

1. In Example 16.1, the final set of equations should be rewritten as:

$$\begin{aligned} Pr\,(\text{claim occurs}|\text{claim occurred}) &= Pr\,(\text{type} = A|\text{claim occurred})\,Pr\,(\text{claim occurs}|\text{type} = A) \\ &\quad + Pr\,(\text{type} = B|\text{claim occurred})\,Pr\,(\text{claim occurs}|\text{type} = B) \\ &\quad + Pr\,(\text{type} = C|\text{claim occurred})\,Pr\,(\text{claim occurs}|\text{type} = C) \\ &= 0.2286(0.8) + (0.4286)(0.5) + (0.3429)(0.2) \\ &= 0.46576 \end{aligned}$$

2. In Section 16.3.1 after the box summarizing the posterior, predictive, and prior distributions on the Gamma-Poisson model, our equation for the Bühlmann credibility-weighted estimate should be:

$$E = z \times (\text{observed data}) + (1 - z) \times \text{prior mean}$$