Corrections to *Probability and Statistics* (Fourth Edition)

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If you find errors in the book not listed here or if you wish to offer comments on the book, send them by email to mark "at" cmu.edu.

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- p. 401, last displayed equaiton: "0.1154)" should read "0.1154" (11/15/10)
- p. 401, last displayed equaiton: "(1.12)" should read "(0.4116)" (11/15/10)

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- p. 536, next line after (9.1.8) "Example 6.5.15" should read "Example 7.5.7" (11/15/10)
- p. 549 Exercise 11: "δ_c" should read "δ" at the ends of parts b and c. (11/15/10)

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- p. 591, Example 9.6.4, line 2: "$\psi =$" should read "$|\psi| =$". (11/15/10)

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- p. 612, 2 and 4 lines after (9.8.16): In both places, "$T_{n-1}^{-1}(1-\alpha_0)$" should read "$-T_{n-1}^{-1}(1-\alpha_0)$" (11/15/10)

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- p. 682, first line of "Ties" secttion: "signed ranks test" should read "ranks test". (11/15/10)

- p. 683, Eq. (10.8.6): The correct formula is

$$\begin{aligned}\mathrm{Var}(S) = mn\big(&\Pr(X_1 \geq Y_1) - (m+n-1)\Pr(X_1 \geq Y_1)^2 \\ &+(n-1)\Pr(X_1 \geq Y_1, X_1 \geq Y_2) + (m-1)\Pr(X_1 \geq Y_1, X_2 \geq Y_1)\big).\end{aligned}$$

  (11/15/10)

- p. 685, Exercise 15: There are a few errors in the statement of the problem. The corrected exercise is given here:

  15. Consider again the conditions of Exercise 1. This time, let $D_i = X_i - Y_i$. Wilcoxon (1945) developed the following test of the hypotheses (10.8.7). Order the absolute values $|D_1|, \ldots, |D_n|$ from smallest to largest, and assign ranks from 1 to n to the values. Then S_W is set equal to the sum of all the ranks of those $|D_i|$ such that $D_i > 0$. If the distribution of D_i is symmetric around 0, then the mean and variance of S_W are

$$E(S_W) = \frac{n(n+1)}{4}, \tag{10.8.8}$$

$$\mathrm{Var}(S_W) = \frac{n(n+1)(2n+1)}{24}. \tag{10.8.9}$$

  The test rejects H_0 if $S_W \geq c$, where c is chosen to make the test have level of significance α_0. This test is called the *Wilcoxon signed ranks test*. If n is large, a normal distribution approximation allows us to use $c = E(S_W) + \Phi^{-1}(1-\alpha_0)\mathrm{Var}(S_W)^{1/2}$.

  a. Let $W_i = 1$ if the $|D_j|$ that gets rank i has $D_j > 0$ and $W_i = 0$ if not. Show that $S_W = \sum_{i=1}^{n} iW_i$.

b. Prove that $E(S_W)$ is as stated in Eq. (10.8.8) under the assumption that the distribution of D_i is symmetric around 0. *Hint:* You may wish to use Eq. (4.7.13).

c. Prove that $\mathrm{Var}(S_W)$ is as stated in Eq. (10.8.9) under the assumption that the distribution of D_i is symmetric around 0. *Hint:* You may wish to use Eq. (4.7.14).

(11/15/10)

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Chapter 11

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- p. 703, 3rd displayed equation: "0.382" should read "−0.382" (11/15/10)
- p. 704, Example 11.2.5, line 3: "−81.049" should read "−81.06" (11/15/10)

Section 11.3

- p. 708, first line after (11.3.2): "$\sum_{j=1} a_{1j}a_{2j}$" should read "$\sum_{j=1}^{n} a_{1j}a_{2j}$". (11/15/10)
- p. 722, Eq. (11.3.30), end of first line: "$\beta^*_{\beta_1}$" should read "β^*_1". (11/15/10)
- p. 728, Exercise 22: The problem should have asked for the regression of logarithm of 1980 price on the logarithm of 1970 price. It can be solved either as stated here or as stated in the text, but the regression on logarithm of 1970 price makes more sense. (11/15/10)

Section 11.4

- p. 731, end of first displayed equation: "$-\dfrac{n\overline{x}_n s_x^2}{\tau\sum_{i=1}^{n} x_i^2}$" should read "$-\dfrac{\tau n\overline{x}_n s_x^2}{\sum_{i=1}^{n} x_i^2}$". (11/15/10)
- p. 731, two lines after (11.4.6): "$-\tau^2/2$" should read "$-\tau/2$". (11/15/10)
- p. 732, first line after (11.4.7): "15" should read "14". (11/15/03)
- p. 734, Example 11.4.4, line 6: "7.191" should read "7.181". (11/15/10)

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- p. 741, Example 11.5.3, end of first displayed equation: "144.1" should read "172.3". (11/15/10)

- p. 743, first line after the end of Theorem 11.5.3: "$j = 1, \ldots, n$" should read "$j = 0, \ldots, p-1$". (11/15/10)
- p. 749, first displayed equation: "$z_{i0}\beta_0 - \cdots - z_{ip-1}\beta_{p-1}$" should read "$z_{i0}\hat{\beta}_0 - \cdots - z_{ip-1}\hat{\beta}_{p-1}$". (11/15/10)
- p. 752, second line of "Summary" section: "$z_{i0}\hat{\beta}_0 + \cdots + z_{ip-1}\hat{\beta}_{p-1}$" should read "$z_{i0}\beta_0 + \cdots + z_{ip-1}\beta_{p-1}$". (11/15/10)
- p. 752, Exercise 2, line 2: "S^2 has the χ^2" should be "S^2/σ^2 has the χ^2". (11/15/10)

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- p. 758, line 5: "Eq. (11.6.8) has the" should read "Eq. (11.6.8), when divided by σ^2, has the". (11/15/10)
- p. 761, Exercise 2, displayed equation: Both places where σ^2 appears in a denominator should be σ. (11/15/10)
- p. 763, Exercise 14(a): "$\sum_{i=1}^{p} \alpha_i$" should be "$\sum_{i=1}^{p} n_i\alpha_i$" (11/15/10)

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- p. 805, Example 12.3.2, first row of last displayed equation: "$f\left(\exp[(y_1^2 + y_2^2)/2], \right.$" should read "$f\left(\exp[-(y_1^2 + y_2^2)/2], \right.$". (11/15/10)
- p. 812, Example 12.3.10, last line: "is" should read "if". (11/15/10)

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- p. 832–834, the numerical part of Example 12.5.6 suffered from an error in the input data. The correct analysis changes the conclusions stated in the text. Corrected text can be found by following the link to more extensive corrections at the top of the web page.
- p. 838, Exercise 12, line 5: "variance γ_0" should read "precision γ_0" (11/15/10)

- p. 838, Exercise 13(a): The "1/2" exponent should be "−1/2" in the displayed formula. (11/15/10)
- p. 838–839, Exercise 14: Add the text "The prior hyperparameters are $\alpha_0 = 0.5$, $\mu_0 = 0$, $\lambda_0 = 1$, and $\beta_0 = 0.5$." (11/15/10)
- p. 839, Exercise 15 part a line 2: Delete the text "if $X_{n+i} \leq c$, then" (11/15/10)
- p. 839, Exercise 15 part b line 2: Delete the text "if $X_{n+i} \geq c$, then" (11/15/10)

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