

1 A Primer on Linear Models

1.1 Corrections 20 April 2009

2 Chapter 2 corrections

Fix page: 27 line 4

error e should be \hat{e} for residuals

orthogonality of the residuals \hat{e} to the columns of the design matrix \mathbf{X}

Fix page: 31 line 11

dimension of matrix \mathbf{A} should be $p \times p$

3 Chapter 3 corrections

Fix page: 49 line 5

first vector in second display should have first component equal to -2 , not -1 , so the vector is $(-2, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0)$

4 Chapter 4 corrections

Fix page: 86 line 16

missing σ^2 $\sigma^2 \mathbf{VX} = (\sigma^2 \mathbf{I}_N + \tau^2 \mathbf{1}_N \mathbf{1}_N^T)$

Fix page: 88 line 3,4

subscript errors

$$\begin{aligned} E(\bar{y}_{i.}) &= \beta_0 + \beta_1 + \beta_2 n_i^{-1} \sum_j x_{ij}^2 \\ &= \beta_0 + \beta_1 + \beta_2 \bar{x}_i^2 + \beta_2 n_i^{-1} \sum_j (x_{ij}^2 - \bar{x}_i)^2 \end{aligned}$$

5 Chapter 6 corrections

Fix page: 125 line -7

Corollary 5.2, not (nonexistent) Corollary 5.5

Fix page: 133 line 7

missing n_i in first sum

$$= \sum_{i=2}^a n_i (\bar{y}_{1.} - \bar{y}_{i.})^2 - \frac{1}{N} \left[\sum_{i=2}^a n_i (\bar{y}_{1.} - \bar{y}_{i.}) \right]^2$$

6 Chapter 8 corrections

Fix page: 181 line -1

fix expression for SSE

$$SSE = \mathbf{y}^T (\mathbf{I} - \mathbf{P}_X) \mathbf{y} = \sum_{i=1}^a \sum_{j=1}^{n_i} (y_{ij} - \bar{y}_i)^2$$

Fix page: 183 line 3,4

divide by upper case N , not lower case n

$$2\phi_a \sigma^2 / N = \frac{1}{N} \sum n_i \alpha_i^2 - \bar{\alpha}^2 = \alpha^T \frac{1}{N} \mathbf{D} \alpha - \frac{1}{N^2} \alpha^T \mathbf{D} \mathbf{1} \mathbf{1}^T \mathbf{D} \alpha = \alpha^T \left[\frac{1}{N} \mathbf{D} - \frac{1}{N^2} \mathbf{D} \mathbf{1} \mathbf{1}^T \mathbf{D} \right] \alpha$$

Fix page: 183 line 19

long expression in exponent in equation (8.4)

$$E(E(e^{Us} | \alpha'_i s)) = (1 - 2s\sigma^2)^{-(a-1)/2} E(e^{s\sigma^2/(1-2s\sigma^2) \times 2\lambda_a})$$

Fix page: 188 line -8

γ not τ

by writing $\gamma_{ij} = v_{ij} - \bar{v}_i$.

Fix page: 188 line -6

display not broken up

$$\begin{aligned} \bar{\gamma}_i &= \bar{v}_i \\ \bar{\gamma}_{.j} - \bar{\gamma}_{..} &= \bar{v}_{.j} - \bar{v}_{..} \\ \gamma_{ij} - \bar{\gamma}_i - \bar{\gamma}_{.j} + \bar{\gamma}_{..} &= v_{ij} - \bar{v}_i - \bar{v}_{.j} + \bar{v}_{..} \end{aligned}$$

Fix page: 189 line 20

subscript upper case N

$\mathbf{e} \sim N_N(\mathbf{0}, \mathbf{R})$

Fix page: 200 line 15

correct mean

$$E \begin{bmatrix} \mathbf{y} \\ y_* \end{bmatrix} = \begin{bmatrix} \mathbf{X} \\ \mathbf{x}_*^T \end{bmatrix} \mathbf{b}$$

Fix page: 200 line 23

subscript, not superscript * whose variance is $\sigma^2(\mathbf{a}^T \mathbf{a} + 1) = \sigma^2(\mathbf{x}_*^T (\mathbf{X}^T \mathbf{X})^g \mathbf{x}_* + 1)$.

Fix page: 200 line 26

subscript, not superscript *

$$\mathbf{x}_*^T \hat{\mathbf{b}} - y_* \sim N(0, \sigma^2(\mathbf{x}_*^T (\mathbf{X}^T \mathbf{X})^g \mathbf{x}_* + 1))$$

Fix page: 200 line 27

subscript, not superscript *

$$Pr(-t_{\alpha/2} < \frac{\mathbf{x}_*^T \hat{\mathbf{b}} - y_*}{\hat{\sigma}(\mathbf{x}_*^T (\mathbf{X}^T \mathbf{X})^g \mathbf{x}_* + 1)^{1/2}} < t_{\alpha/2}) = 1 - \alpha$$

Fix page: 200 line 28,29

subscript, not superscript *

$$= Pr(\mathbf{x}_*^T \hat{\mathbf{b}} - t_{\alpha/2} \hat{\sigma}(\mathbf{x}_*^T (\mathbf{X}^T \mathbf{X})^g \mathbf{x}_* + 1)^{1/2} < y_* < \mathbf{x}_*^T \hat{\mathbf{b}} + t_{\alpha/2} \hat{\sigma}(\mathbf{x}_*^T (\mathbf{X}^T \mathbf{X})^g \mathbf{x}_* + 1)^{1/2})$$

Fix page: 200 line 31 or -3

subscript, not superscript *

$$\mathbf{x}_*^T \hat{\mathbf{b}} \pm t_{\alpha/2} \hat{\sigma}(\mathbf{x}_*^T (\mathbf{X}^T \mathbf{X})^g \mathbf{x}_* + 1)^{1/2}.$$

Fix page: 201 line 1

sign of second term

$$Var(\mathbf{a}^T \mathbf{y} - y_*) = \mathbf{a}^T \boldsymbol{\Omega} \mathbf{a} - 2\mathbf{a}^T \boldsymbol{\omega} + \omega_{**}.$$

Fix page: 201 line 3

missing zero RHS

Unbiasedness again means that $\mathbf{a}^T \mathbf{X} \mathbf{b} - \mathbf{x}_*^T \mathbf{b} = 0$ for all \mathbf{b} , or $\mathbf{X}^T \mathbf{a} - \mathbf{x}_* = 0$.

Fix page: 201 line 5

change both signs

$$\boldsymbol{\Omega} \mathbf{a} - \boldsymbol{\omega} - \mathbf{X} \boldsymbol{\lambda} = \mathbf{0},$$

7 Chapter 9 corrections

8 Appendix A corrections

Fix page: 263 line -6

subscript missing on matrix on left hand side of display, should read

$$\mathbf{G}_2 = \mathbf{C}^{-1} \begin{bmatrix} \mathbf{I}_r & \mathbf{E}_1 \\ \mathbf{E}_2 & \mathbf{E}_2 \mathbf{E}_1 \end{bmatrix} \mathbf{B}^{-1}$$

9 Acknowledgements

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JF Monahan, last update 20 April 2009