

Errata for *A Mathematics Course for Political and Social Research* by Will H. Moore and David A. Siegel

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Chapter 2

- Page 70, sentence above Multiplication and Division header: It should read “either because both of x and y are zero.”

Chapter 3

- Page 79, exercise 18: There should be this additional line at the end of the question:
Solution: $\log y = \beta(\log x_1) - n \log x_2 + 2 \log x_3$.

Chapter 4

- Page 83, third line from the top: The equation at the end of the line should read:
 $1 - \delta + \delta - \delta^2 + \delta^2 - \dots$
- Page 99, exercise 6: The exercise should read: Show whether $f(x) = \frac{x^3-8}{x-2}$ has a limit at $x = 2$ and, if so, provide the value of the limit.

Chapter 5

- Page 116, exercise 5c: The exercise should read: $f(x, z) = 5xz + 7xz^2 + 9x^2$.

Chapter 7

- Page 142, third line from the top: The second sentence should begin: Since $\frac{da^x}{dx} = (\ln(a))a^x$.
- Page 145: Every 2π in a denominator on this page should instead be a $\sqrt{2\pi}$.

- Page 146: This is not an error, but note that we flipped the use of the variables x and u relative to their use earlier in the chapter. In other words, we substitute u for $g(x)$ on this page rather than x for $g(u)$ as we do on page 144.
- Page 148, eighth line from the bottom. The function in parentheses should be e^{-x^2} .

Chapter 8

- Page 154, lines 8 and 9 from the top: This should read “always be zero for interior (i.e., not boundary) points, and hence the first derivative of the function at an interior point that is an extremum will always equal zero as well.”
- Page 158, line 14 from the top (last line of the first full paragraph): This should read $\frac{\partial^2 f(x,y)}{\partial x \partial y}$.
- Page 166, line 11 in 8.3.4 (third line in the third paragraph in this section): This should read “Similarly, the local minimum is at $x = 2$, and at this point the function has a value of $f(2) = 3$.”
- Page 170, second line up from the exercises: The equation should read: $\vec{\beta}^* = (X^T X)^{-1} X^T \vec{y}$.
- Page 171, exercise 1i: The bounds should instead be $[-0.8, 1]$.
- Page 171, exercise 3: This should also say “Take the Taylor series around the point $x = 0$.”

Chapter 9

- Problem 22 on Page 196 should say “Monty” rather than “Monte.”

Chapter 10

- Page 230, second equation from the bottom: The sum should read:

$$\sum_{i=0}^{\infty} \frac{\mu^i i}{i!} = 0 + \sum_{i=1}^{\infty} \frac{\mu^i i}{i!} = \sum_{i=1}^{\infty} \mu \frac{\mu^{i-1}}{(i-1)!} = \mu \left(\sum_{i=0}^{\infty} \frac{\mu^i}{i!} \right) = \mu e^{\mu}.$$

- Page 240, third line from the bottom: It should be “maneuvers.”

Chapter 11

- Page 254, second to last line from the bottom of the main text: Ryan’s utility for losing should be $-(\frac{1}{2} - 0)^2 = -\frac{1}{4}$.

Chapter 12

- Page 287, third line from the top: It should be c_{ij} .
- Page 295, third equation from the top: The LHS should be A .
- Page 300, starting at the top. The first two matrix computations should be:

$$X^T X = \begin{bmatrix} 7 & 190,176 \\ 190,176 & 5,210,158,442 \end{bmatrix}.$$

and

$$(X^T X)^{-1} = \begin{bmatrix} 0.144 & -5.27 \times 10^{-8} \\ -5.27 \times 10^{-8} & -1.94 \times 10^{-12} \end{bmatrix}.$$

The computation of the product of X^T and \mathbf{y} is correct. The next computation should instead be as follows:

$$\hat{\boldsymbol{\beta}} = (X^T X)^{-1} X^T \mathbf{y}:$$

$$\hat{\boldsymbol{\beta}} = \begin{bmatrix} \alpha \\ \beta \end{bmatrix} = \begin{bmatrix} 0.144 & -5.27 \times 10^{-8} \\ -5.27 \times 10^{-8} & -1.94 \times 10^{-12} \end{bmatrix} \times \begin{bmatrix} 122.9 \\ 3,301,785.2 \end{bmatrix} = \begin{bmatrix} 17.5591 \\ -7.20 \times 10^{-8} \end{bmatrix}.$$

Finally, the next sentence should read:

We thus have an OLS estimate of 17.5591 for α and -7.20×10^{-8} for β .

Chapter 13

- Page 325, exercise 4: The two vectors should be $\mathbf{g} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and $\mathbf{h} = (1, 2)$.

Chapter 14

- Page 336, second line from bottom: The first expression on the line should be $\det(QDQ^{-1})$.

Chapter 15

- Page 365, second full paragraph, second equation on the page: This should be $f \approx f(\mathbf{a}) + \nabla f(\mathbf{a}) \cdot (\mathbf{x} - \mathbf{a})$.
- Page 368, fourth paragraph, first equation: This should read $f \approx f(\mathbf{a}) + \nabla f(\mathbf{a}) \cdot (\mathbf{x} - \mathbf{a}) + \frac{1}{2}(\mathbf{x} - \mathbf{a})^T H(\mathbf{a})(\mathbf{x} - \mathbf{a})$.
- Page 375, exercise 6: The sentence “Is f concave, convex, or neither?” should be deleted.

Chapter 16

- Page 379, fourth line from the bottom of the long central paragraph: This should read “If the determinant is zero.”
- Page 384: This is not an error, but we were remiss in not noting a potentially helpful intuition. One can safely add the equality constraint to the objective function in the Lagrangian because, at the constrained maximum, this constraint must equal zero. Thus, one is effectively adding zero (at the optimum), which doesn’t change the optimum.
- Page 385: This is not an error, but our overuse of the letter m can make things confusing. We recommend replacing m with r throughout the first full paragraph on the page.
- Page 385, first line in second full paragraph: This should read “For a general symmetric $(m + n) \times (m + n)$ matrix.”
- Page 393, sixth line from the bottom in the third full paragraph: This should read “and the constraints g_i and h_j .”