A Primer on the Calculus of Variations and Optimal Control Theory: Errata

Mesterton-Gibbons, STML 50
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Page 33, Exercise 4.4: Replace “x(1) = 0” by “x(1) = 2”

Page 63, (8.36): Replace “n” by “η”

Page 105, two lines below (13.16): Replace “the second of which requires k ≥ 4” by “which together require k > 4”

Page 105, first unnumbered display: Replace “l ≥ 9 2” by “l > 9 2”

Page 105, three lines below second unnumbered display: Replace “l ≥ 9 2” by “l > 9 2”

Page 106, first line: Replace “(because y > 0)” by “, because we can safely assume y > 0 on Γ when maximizing (13.8)”

Page 131, first line of new paragraph: Insert “at rest” immediately after “initially”

Page 132, (16.21): Replace “sgn” by “δ” (twice); replace “t_c” by “t_s” (twice) in the first two lines of the display; replace
“$t_s$” by “$t_c$” (twice) in the last two lines of the display; and replace the period by a comma

Page 132, immediately below (16.21): Insert “where $\mathcal{H}$ denotes Heaviside’s step function [7, p. 307].”

Page 132, line below (16.21): Replace “It is straightforward to” by “We” and delete “indeed”

Page 134, Exercise 16.1, last line: Replace “$\dot{y} = tu$” by “$\dot{y} = t^2u$”

Page 168, third line: Replace “$R_n$” by “$\Re_n$” (twice)

Page 233, Lecture 14: Replace “1.” by “2.”

Page 238, Exercise 19.1 (c), second line: Replace “admissible” by “potentially admissible”

Page 238, Exercise 19.1 (c), sixth line: Replace “For (b), the associated cost is $J = \frac{1}{2}(8\sqrt{2} - 11)^{1/2} + \frac{4}{5}(\{4\sqrt{2} - 2\}^{1/2} - \{\sqrt{8} - 1\}^{1/2}) - \frac{1}{10} \approx 0.5161$” by “(b) is inadmissible because it violates $|u| \leq 1$ between $(1, 1)$ and $(1, -1)$, where $x_1 > 1 \implies u_s < -1$.”
The following errata concern only the original printing (not the corrected 2014 reprint):

Page 50, Exercise 6.4: The lower integration limit is “a,” not “0”
Page 52, line below (7.10): Replace “k = η′(x)” by “k = εη′(x)”
Page 53, first line of (7.11): Replace “η′(x)” by “εη′(x)”
Page 56, first display: Replace \[ \frac{1}{2} \left\{ -\frac{\pi^2 K_1}{\delta^2} \cdot 1^2 + K_2 \cdot 1^4 \right\} \left\{ c + \delta - (c - \delta) \right\} = -\frac{\pi^2 K_1}{\delta} + \delta K_2, \]
by
\[ \frac{1}{2} \int_{c-\delta}^{c+\delta} \left\{ -\frac{\pi^2 K_1}{\delta^2} \sin^2 \left( \frac{2\pi \{x - c\}}{\delta} \right) + K_2 \cdot 1^4 \right\} \, dx = -\frac{\pi^2 K_1}{2\delta} + \delta K_2, \]
Page 59, (8.12): Replace “w(b)” by “w(c)”
Page 61, second line of (8.22): Replace “k” by “\( \sqrt{k} \)”
Page 81, two lines below (11.1): Replace “case.” by “case; and so here we regard an extremal as admissible if, in lieu of (2.2), it satisfies appropriate endpoint conditions that we are about to determine.”
Page 83, (11.13): Replace “\( y_x(x, \epsilon) \)” by “\( y_x(x, \epsilon) \)”
Page 86, two lines below (11.27): Replace “\( dx_A, dy_A, dx_B \) and \( dy_B \)” by “\( dx_A, dy_A \) and \( dx_B, dy_B \)”
Page 87, (11.35): Replace “\(|k|\)” by “\( k \)”
Page 87, line below (11.35): Replace “\( k \)” by “\( k \) (> 0)\)”
Page 90, Exercise 11.4: Replace “\( xy^2 + \sqrt{xy} \)” by “\( xy^2 + \sqrt{xy} \)”
Page 99, last sentence of lecture: Replace “Henceforward” by “In Lectures 13 and 14”
Page 102: Delete “\{” from the first integral
Page 104, Figure 13.1: Replace “\( \Gamma_0 \)” by “\( \Gamma_0 \)”
Page 112, second line: Replace “(1, 0)” by “(0, 1)”
Page 120, (15.3): Replace \[ \int_a^b y \, ds \] by \[ \int_0^1 ds \]
Page 129, three lines below (16.8): Replace “$\dot{X}/X$” by “$dX/dt$”
Page 131, last two lines: Replace “$x >$” by “$x_1 >$” and “$x <$” by “$x_1 <$” (twice)
Page 132, first line: Replace “$x >$” by “$x_1 >$”
Page 137, (17.12): Replace “$\delta x_i(t) + o(\delta t)$” by “$\delta x_i(t_1) + o(\delta t)$”
Page 141, line below (17.27): Replace “transfers” by “transfers”
Page 148, first line: Replace “$x_3(0) = 0$” by “$x_3(t_0) = 0$”
Page 161: Replace (19.15) by
$$\ddot{\sigma} = e^{-\delta x_2}\left(\{1 - 4x_1 - \delta + \theta\}x_1 - \delta\{x_1(1 - 2x_1 + \theta) - \delta(x_1 - \theta)\}\right)$$
$$= e^{-\delta x_2}\{1 - 4x_1 - \delta + \theta\}x_1 = -e^{-\delta x_2}\left(2x_1 + \frac{\delta \theta}{x_1}\right)\dot{x}_1$$
$$= x_1 e^{-\delta x_2}\left(2x_1 + \frac{\delta \theta}{x_1}\right)(q u - 1 + x_1)$$
Page 162, Exercise 19.1: Replace “(with $t_1$ unspecified)” by “for suitable $t_1$”
Page 169, fourth line: Replace “$TA^*$” by “$T^*A^*$”
Page 174, (21.20), lower integration limit: Replace “$0$” by “$t_0$”
Page 175, (21.22): Replace “$x(t_1)$” by “$x_0(t_1)$”
Page 177, footnote, line 8: Replace “$\lambda_0 + K\sin(\theta) + u^*\tan(\theta)$” by “$\lambda_0 + K\{\sin(\theta) + u^*\tan(\theta)\}$”
Page 177, footnote, line 9: Replace “$\lambda_0 + K\sin(\theta) \pm \tan(\theta)$” by “$\lambda_0 + K\{\sin(\theta) \pm \tan(\theta)\}$”
Page 178, (21.38): Replace “$\lambda_2(t_1)$” by “$\lambda_1(t_1)$” in denominator
Page 225, Exercise 3.4, last line: Replace “$\phi(t) = \frac{4}{3}(t^4 - 1)$” by “$\phi(t) = \frac{4}{3}(4t^4 - 1)$”
Page 226, Exercise 4.5, end of 4th line: Replace “$\pm$” by “$\pm$”
Page 227, Exercise 6.4: Replace “$\leq$” by “$>$”
Page 229, Exercise 10.1: Replace all by “Here
$$E(x, \phi(x), \phi'(x), \omega) = \cos(2\omega) - \cos(2) + 2(\omega - 1)\sin(2)$$
fails to be nonnegative; for example, it is negative if $\omega \leq 0$.”
Page 229, Exercise 10.6: Delete this line
Page 239, Exercise 21.4, second line: Interchange (a) and (b)
Page 241, top line: Change “γa/(1+\(\frac{1}{2}γπ\))” to “γa sin(t)/(1+\(\frac{1}{2}γπ\))”