

An Introduction to the Mathematics of Financial Derivatives

Errata

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List of errata

Page 22 — 3 lines below the 2nd equation, “Eq.(2.48) will not be satisfied with positive” should be “Eq.(2.48) will not be satisfied with positive ψ_1, ψ_2 ”

Page 22 — 2 lines above the 3rd equation, “we see that the existence of positive” should be “we see that the existence of positive ψ_1, ψ_2 ”

Page 22 — Last sentence before 2.3.1, “role played by the” should be “role played by ψ_i in the”

Page 30 — In Theorem 2, “exists a > 0 ” should be “exists a $\psi > 0$ ”

Page 30 — Last sentence before formula (2.82), “state-price vector” should be “state-price vector ψ ”

Page 36 — Formula (3.13), $0 = t_0, \dots, t_n$ should be $0 = t_0 \leq t_1 \leq t_2 \leq \dots \leq t_n = T$

Page 36 — Formula (3.14), $f : [0, T] \rightarrow \mathbb{R}$ should be $f : [0, T] \rightarrow \mathbb{R}$

Page 44 — The two references to formula (3.43) and (3.42) should be to (3.42) and (3.41)

Page 45 — Below formula (3.49), $\max_i |t_i - t_{i-1}|$ should be $\max_i |t_i - t_{i-1}| \rightarrow 0$

Page 46 — Below formula (3.57), “ $f(\cdot)$ is random while $f(\cdot)$ is ” should be “ $f(\cdot)$ is random while $h(\cdot)$ is ”

Page 48 — Left column, all five references to formula (3.65) should be to (3.64)

Page 50 — Below formula (3.83), the formula references should be to (3.81), (3.83), and (3.81)

Page 82 — Below formula (5.60) “Here represents” should be “Here (5.60) represents”

Page 90 — Below formula (6.12), the two formula references should be to (6.11) and (6.12)

Page 98 — Above formula (6.69), the two formula references should be to (6.67) and (6.68)

Page 103 — Below formula (6.105), the two formula references should be to (6.105) and (6.102)

Page 104 — Left column top, the formula reference should be to (6.109)

Page 104 — Right column, the two formula references should be to (6.110) and (6.111)

Page 105 — The seven formula references should be to (6.112), (6.113), (6.112), (6.113), (6.114), (6.115), and (6.112)

Page 106 — Right column, the 2 formula references should be to (6.122) and (6.122)

Page 107 — The six formula references should be to (6.113), (6.112), (6.127), (6.127), (6.127), and (6.127)

Page 108 — The three formula references should be to (6.127), (6.135), and (6.139)

Page 108 — Formula (6.140),

$$\mathbb{E}_t^{\mathbb{Q}} \left\{ \sum_{i=0}^n [(\Delta\alpha_{t_i})\tilde{B}_{t_{i+1}} + (\Delta\alpha_{t_i})\tilde{S}_{t_{i+1}}] \right\}$$

should be

$$\mathbb{E}_t^{\mathbb{Q}} \left\{ \sum_{i=0}^n [(\Delta\alpha_{t_i})\tilde{B}_{t_{i+1}} + (\Delta\alpha_{t_i})\tilde{S}_{t_{i+1}}] \right\} = 0$$

Page 109 — The two formula references should be to (6.127) and (6.109)

Page 113 — Formula (7.9) the last term on the right hand side, $\frac{1}{3}(\Delta x)^3$ should be $\frac{1}{3}f_{xxx}(\Delta x)^3$

Page 121 — Above section 7.8, “the ratio of ΔW_k to” should be “the ratio of ΔW_k to”

Page 132 — The five formula references should be to (8.23), (8.23), (8.24), (8.28), and (8.29)

Page 133 — Above formula (8.30), the formula reference should be to (8.24)

Page 133 — Formula (8.39), $\frac{1}{2} \geq r_i \geq 0$ should be $\frac{1}{2} \geq r_i > 0$

Page 133 — Formula (8.43) should add “= 0” at the end of the right hand side

Page 140 — The eight formula references should be to (8.79-8.81), (8.79-8.81), (8.78), (8.79-8.81), and (8.85)

Page 142 — Formula (8.96) and (8.97), remove the “log” from the left side of each

Page 142 — The eight formula references should be to (8.96), (8.97), (8.79-8.81), (8.79), (8.80), (8.83) and (8.84)

Page 166 — Formula (10.17), the term $+\frac{1}{2}F_{tt}[h]$ should be $+\frac{1}{2}F_{tt}[h^2]$, the term $+F_{st}[h(a_k h + \sigma_k \Delta W_k)]$ should be $+F_{st}[h][(a_k h + \sigma_k \Delta W_k)]$

Page 166 — Two paragraphs below formula (10.17), the term $F_{st}[h(a_k h + \sigma_k \Delta W_k)]$ should be $F_{st}[h][(a_k h + \sigma_k \Delta W_k)]$

Page 167 — Formula(10.18) should add “+R” at the end of the right hand side

Page 169 — Formula (10.30) and (10.34), the term

$$\frac{1}{2}F_{ss} \left[\frac{a_k h^2}{h} + \frac{(\sigma_k \Delta W_k)^2}{h} + \frac{2a_k \sigma_k h \Delta W_k}{h} \right]^2$$

should be

$$\frac{1}{2}F_{ss} \left[\frac{a_k h^2}{h} + \frac{(\sigma_k \Delta W_k)^2}{h} + \frac{2a_k \sigma_k h \Delta W_k}{h} \right]$$

Page 171 — Formula (10.44), $\sigma(I_t, t) = 1$ should be $\sigma(I_t, t) = 2W_t$

Page 171 — Formula (10.53) the term $+\frac{1}{2} \int_0^2 dt$ should be $+\frac{1}{2} \int_0^t ds$

Page 171 — Formula (10.55) the term $-\frac{1}{2} \int_0^2 dt$ should be $-\frac{1}{2}t$

Page 173 — Formula (10.69), the left hand side, dF_t should be dF , on the right hand side the term $+F_{s_1 s_2} dS_1 dS_2$ should be $+2F_{s_1 s_2} dS_1 dS_2$

Page 174 — Formula (10.74), on the left hand side, neither dS_1 nor dS_2 should be squared

Page 174 — Formula (10.78), on the left hand side, dF_t should be dF , on the right hand side the term $+F_{rR}$ should be $+2F_{rR}$

Page 177 — Problem 3 c), “contain the term, what” should be “contain the $\frac{1}{2}\sigma^2 t$ term, what”

Page 183 — Formula (11.14), all S_t should be \tilde{S}_t

Page 185 — Formula (11.29), on the left hand side, $\int_0^t \sigma dW_u$ should be $\int_0^t \frac{1}{S_u} dS_u$

Page 185 — Second line after (11.30), “ a and of time t ” should be “ a and σ , of time t ”

Page 186 — Formula (11.39), $e^{\sigma W_T}$ should be $e^{\sigma W_T}$

Page 186 — Right column above (11.40) “expectation in two” should be “expectation $E_t[e^{\sigma W_T}]$ in two”

Page 186 — Formula (11.40), the term $e^{\sigma W_t}$ should be $e^{\sigma W_T}$

Page 187 — Formula(11.44), the second integral should specify 0 to t

Page 187 — Formula (11.46) should add “= 0” at the end

Page 187 — Formula (11.47) on the right hand side only, $\mathbb{E}[Z_t]$ should be $\mathbb{E}[Z_s]$

Page 187 — Below (11.50), “Going back to $\mathbb{E}_t[S_t]$ ” should be “Going back to $\mathbb{E}_t[S_T]$ ”

Page 187 — Formula (11.51) should have $\mathbb{E}_t[S_T]$ on the left and $\mathbb{E}_t[Z_T]$ on the far right

- Page 187 — Formula (11.52), the left hand side, $\mathbb{E}_t[S_t]$ should be $\mathbb{E}_t[S_T]$
- Page 187 — Formula (11.53), should add “ $\mathbb{E}_t[S_T] =$ ” as the left hand side
- Page 187- 189 — Label the equation above the Formula (11.53) as (11.53) and add the numbering by 1 from the original (11.53) to (11.65)
- Page 188 — Right column, last 2 paragraphs, the references to (11.59) should be to (11.58)
- Page 189 — Formula (11.69), right hand side should be $\mu dt + \sigma W_t$
- Page 190 — Left column, 3 lines below (11.73), “proportional instead” should be “proportional to $\sqrt{S_t}$ instead”
- Page 191 — Right column, the equation after (11.79), W_t should be W_{2t}
- Page 191 — Right column bottom, “Note what Eq.(11.80) says” should be “Note what this equation says”
- Page 194 — Left column last equation, the term $\gamma = \left(\frac{t}{\nu}, \nu\right) dg$ should be $\gamma \left(\frac{t}{\nu}, \nu\right) dg =$
- Page 194 — Left column, second to last paragraph, “relative to the normal for the return distribution” should be “relative to the return for the normal distribution”
- Page 195 — Problem 3, in the equation, the term $+0.05\sigma S_t dW_t$ should be $+0.05S_t dW_t$
- Page 201 — Equation (12.24) is correct by Ito’s product rule
- Page 201 — Equation above (12.25), the term σdW_t should be $\sigma S_t dW_t$
- Page 202 — Left column, 3rd line, “additional term.” should be “additional term $S_t^2 F_{ss}(\sigma dW_t + (\mu - r)dt.$ ”
- Page 202 — Left column, 2nd equation, $\mathbb{E}^{\mathbb{P}}[\dots]$ should be $\mathbb{E}^{\mathbb{Q}}[\dots]$
- Page 202 — Formula (12.31) the term $F_s(X, t)$ and $F_{ss}(X, t)$ should be $F_X(X, t)$ and $F_{XX}(X, t)$
- Page 205 — Left column, line after (12.37), $F(Sl, t)$ should be $F(S_t, t)$
- Page 205 — Formula (12.38) right hand side should be $6 - 2S_5$
- Page 216 — Formula (13.3), the term $+rF_t S_t$ should be $+rF_s S_t$
- Page 216 — Formula (13.6), the term $+K$ should be $-K$
- Page 216 — Formula (13.10), $\sigma = 0.80$

Page 217 — Formula (13.11), $B(130, 0.2)$ should be $F(130, 0.2)$

Page 217 — Right column, 4th line, “Figure 8” should be “Figure 13.6”

Page 220 — Right column, in the line after (13.33), the formula reference should be to (13.31)

Page 221 — Left, footnote 4 should be marked at the end of the 2nd paragraph in section 13.6.1

Page 223 — Formula (13.44) the term $\frac{1}{2}\sigma_t^2 F_{ss}$ should be $\frac{1}{2}F_{ss}\sigma^2 S_t^2$

Page 225 — Right column, 4th line before section 13.7.3, the formula reference should be to (13.47)

Page 226 — Left column, 2nd line before section 13.7.4, the formula reference should be to (13.47)

Page 228 — Exercise 2, in the question the term e^{-rtX_t} should be $e^{-rt}X_t$

Page 228 — Exercise 2(a), $\mathbb{E}[X_t|X_s, s < t] = e^{-rt}X_s$ should be $\mathbb{E}^p[e^{-rt}X_t|X_s, s < t] = e^{-rs}X_s$

Page 228 — Exercise 2(b), the term $\mathbb{E}[X_t|X_s, s < t]$ should be $\mathbb{E}[e^{-rt}X_t|X_s, s < t]$

Page 228 — Exercise 2(b), In the comment, e^{-rtX_t} should be $e^{-rt}X_t$

Page 228 — Exercise 2(d), In the comment, e^{-rtX_t} should be $e^{-rt}X_t$

Page 236 — Left column, 2 lines to 1 line before (14.22), “a new random variable. This...” should be “a new random variable $\tilde{R}_t = R_t + \mu$. This...”

Page 236 — Right column, 2nd paragraph 4th line, $\mathbb{E}[\cdot]$ should be $\mathbb{E}_t[\cdot]$

Page 236 — Formula (14.28) right hand side, $1 + r_t$ should be $\mu + r_t$

Page 237 — Left column, 2nd line, “and is the” should be “and $\frac{1}{(1+r_t)}$ is the”

Page 237 — Left column, footnote 5, in the equation’s denominator, $\mathbb{E}[R]_t$ should be $\mathbb{E}[R_t]$

Page 241 — Formula (14.57), the $[\mu_1, \mu_1]$ vectors should be $[\mu_1, \mu_2]$ for all 3 places

Page 241 — The line after (14.58), (z_{1t}, z_{2t}) should be $\mathbb{Q}(z_{1t}, z_{2t})$

Page 242 — Formula (14.68), (14.69), (14.70), and (14.71), all the $d\xi(z_t)$ should be $\xi(z_t)$

Page 242 — Left column, 2nd line below (14.69), “measure with” should be “measure \mathbb{Q} with”

Page 242 — Left column, next paragraph 2nd line, “derivative of with” should be

“derivative of \mathbb{Q} with”

Page 242 — Right column, line before (14.74), “two measures; and \mathbb{P} ” should be “two measures \mathbb{Q} and \mathbb{P} ”

Page 243 — Formula (14.76), (14.77), and (14.84), $t \in [0, \infty)$ should be $t \in [0, T]$

Page 244 — Right column, 2nd paragraph after 3., 2nd line, “drift under \mathbb{P} , hence can be” should be “drift under \mathbb{P} . Hence, W_t^* can be”

Page 244 — Right column, 3rd paragraph after 3., 1st line, “Also, because contains” should be “Also, because W_t^* contains”

Page 245 — Formula (14.102) and (14.103), on the right side, S should be S_t

Page 246 — Formula (14.105), the term $-\frac{1}{\sigma^2}$ should be $-\frac{1}{\sigma^2}$

Page 247 — Formula (14.106), the term $-\frac{1}{\sigma^2}$ should be $-\frac{1}{\sigma^2}$

Page 247 — Formula (14.110), on the right hand side, the term $r_t \Delta$ should be $r_t \Delta + 1$

Page 247 — Left column, 7th line after (14.112), \mathbb{Q} should be S_T^j

Page 248 — Formula (14.132) should be $\mathbb{E}^{\mathbb{P}}[Z_t 1_A] = 1$

Page 249 — Right column, two lines before (14.142), Zt should be Z_t

Page 248 — Formula (14.143) and (14.144), the term dW_t should be out of the e exponent

Page 253 — Formula (15.1) the term $e^{r(T-t)}$ should be $e^{-r(T-t)}$

Page 254 — Formula (15.2) the term σt should be $\sigma^2 t$

Page 257 — Formula (15.37) and (15.38), the term e^{-rt} should be $e^{-r(t-u)}$

Page 258 — Left column, 2nd line from the bottom, “with in (15.47).” should be “with W_t^* in (15.47).”

Page 258 — Right column, 2nd to 3rd lines of the first paragraph, “substituting in place of” should be “substituting W_t^* in place of”

Page 258 — Right column, next to last line of the first paragraph, “error terms will” should be “error terms dW_t^* will”

Page 258 — Formula (15.50), the term $S_t dt$ after the bracket] should be dt

Page 260 — Formula (15.60), (15.65), (15.68), (15.69) twice, and (15.71), drop the π in the exponent, but leave it in the denominator

Page 261 — Formula (15.76), both dY_T should be dZ

Page 261 — Formula (15.81), the term $e^{-\frac{1}{2}(Z-\sigma\sqrt{T})^2}$ should be $e^{-\frac{1}{2}(Z+\sigma\sqrt{T})^2}$

Page 261 — Formula (15.83), add the term $= S_0 N(d_1)$ to the end of the right hand side

Page 263 — Formula (15.90), the term $[\mu_t - r]S_t dt$ should be $[\mu_t - rS_t]dt$

Page 263 — Formula (15.91), the term $[\mu_t - r] > 0$ should be $[\mu_t - rS_t] > 0$

Page 263 — Left column, in footnote 5, the term $\mu t dt$ should be $\mu_t dt$

Page 264 — Formula (15.106), (15.109), and (15.110), the term $\frac{1}{2}F_{ss}\sigma_t^2 dt$ should be $\frac{1}{2}F_{ss}\sigma_t^2$

Page 264 — Formula (15.108) the term $+F_s\mu$ should be $+F_s\mu_t$, the term $\frac{\mu_t - rS_t}{\sigma_t}$ should be $\sigma_t F_s \left(\frac{\mu_t - rS_t}{\sigma_t}\right)$

Page 265 — Formula (15.112), the term $\frac{1}{2}F_{ss}\sigma_t^2 dt$ should be $\frac{1}{2}F_{ss}\sigma_t^2$

Page 265 — Formula (15.113), the term $\frac{\mu_t - rS_t}{\sigma_t}$ should be $\frac{\mu_t - rS_t}{\sigma_t} dt$

Page 265 — Formula (15.114), the term dW_t^* should be dW_μ^*

Page 266 — Formula (15.115), add the term $< \infty$ to the right hand side

Page 266 — Formula (15.116), the term $d\mu$ should be dW_μ^*

Page 266 — Formula (15.118), the μ subscripts should be t subscripts

Page 274 — Right column, in the equation before (16.2), the term $(a(r_t, t) - \lambda_t \sigma(r_t, t) dt)$ should be $(a(r_t, t) - \lambda_t \sigma(r_t, t)) dt$

Page 279 — Left column, below $\mathbb{Q}_\mu = (1 + r\Delta)\psi^\mu$ remove “gave” and insert $1 = \mathbb{Q}_\mu + \mathbb{Q}_d$

Page 280 — Left column, footnote 3, drop the word “time”

Page 282 — Right column, last line, L_{t_3} should be L_{t_2}

Page 286 — The term F_{t_i} should be F_{t_1} twice below (17.25), once below (17.28), and once in (17.29)

Page 289 — Right column, 3rd line after (17.52), K should be L_{t_2}

Page 290 — Left column, last paragraph 5th and 11th lines, $B_{t_2}^s$ should be $B_{t_1}^s$

Page 295 — Left column, $C_{t_2}^{ij}$ should be $C_{t_3}^{ij}$

Page 295 — Right column, 1st and 2nd paragraphs, Δ should be δ

Page 295 — Right column, 2nd line below (17.106), the formula reference should be to (17.105), two words later, Fl should be F_t

Page 296 — Left column, 3rd line, “risk-neutral measure Black-Scholes framework” should be “risk-neutral measure \mathbb{Q} . Black-Scholes framework”

Page 296 — Left column, 1st paragraph last line, the formula reference should be to (17.108)

Page 297 — Right column, 2 lines below (17.114), B_l should be B_t

Page 297 — Right column, (17.115) and (17.116), the term

$$\begin{bmatrix} \frac{1}{B_t^s} \\ \frac{1}{B_t} \end{bmatrix}$$

should be

$$\begin{bmatrix} \frac{1}{B_t^s} \\ \frac{1}{B_t} \end{bmatrix}$$

Page 298 — Exercise 2(c) should refer to questions 1. and 2.

Page 299 — Exercise 3(c), the term r_1 should be r_t

Page 303 — Right column, Definition 22, $B(t, T)$ should be $R(t, T)$

Page 305 — Formula (18.9), the term $e^{-r(t, T)}$ should be $e^{-r(T-t)}$

Page 306 — Left column, 2nd to 3rd line, “can invest dollars in a” should be “can invest $e^{-r(T-t)}$ dollars in a”

Page 306 — Right column, 3rd line, the term $e_t^{-r(t, T)}$ should be $e_t^{-r(T-t)}$

Page 307 — Left column, in 5 places the term $e^{-r(t, T)}$ should be $e^{-r(T-t)}$

Page 307 — Left column, 2nd to 3rd line, “and invest of the proceeds” should be “and invest $e^{-r(T-t)}$ of the proceeds”

Page 307 — Left column, 10th line, “borrow dollars” should be “borrow $e^{-r(T-t)}$ dollars”

Page 308 — Formula (18.14), the left hand side should be $B(t, t + n\Delta)$

Page 308 — Formula (18.16) right hand side, the last term $e^{-r_t + \nu\Delta}$ should be $e^{-r_t + n\Delta}$

Page 309 — Right column, 2 lines after (18.24), “discount the to time t” should be “discount the $B_{t+\Delta}^*$ to time t”

Page 310 — Left column, 2 lines after (18.26), “amount at a rate” should be “amount B_t^* at a rate”

Page 310 — Formula (18.28), the term $t + (n - 1)\Delta$ should be $t + (n - 1)\Delta$

Page 311 — Right column, 5 lines after (18.41), the formula reference should be to (18.40)

Page 312-313 — Formula (18.47) to (18.51) in each the exponent needs a negative sign

Page 316 — Left column, equation on line 6, the integrand should be $F(t, s)$ not r_s

Page 318 — Formula (19.9), the term $\sigma(r_t, t)$ should be $b(r_t, t)$

Page 320 — Left column, 2nd equation, the left hand side should be $C(r_T, R_T, T)$

Page 322 — Right column, 6 lines below (19.13), Bt should be B_t

Page 322 — Right column, 2 lines below (19.14), “real-world probability \mathbb{Q} .” should be “real-world probability \mathbb{P} .”

Page 324 — Formula (19.20), the second $\frac{1}{2\Delta}$ on the right hand side should be $\frac{1}{\Delta}$

Page 324 — Right column, in (19.22) and the line below, the term $a(F(t, T), T)$ should be $a(F(t, T), t)$ and the term $b(F(t, T), T)$ should be $b(F(t, T), t)$

Page 325 — Right column, page 325 right, 2 lines before (19.27), r_t should be r_τ

Page 325 — Formula (19.29), the term $\int_s^t b(s, u)du$ should be $\int_s^T b(s, u)du$

Page 326 — Formula (19.30), the term (r_s, τ) should be (r_s, t)

Page 327 — Formula (19.38), the term $(\kappa - r_t)$ should be $(\kappa - r_{t-\Delta})$

Page 330 — Left column, question 3(a), “ $i = 03$ ” should be “ $i = 0$ ”