LECTURES ON MATHEMATICAL FINANCE AND RELATED TOPICS
BOOK CORRECTIONS AND COMMENTS.

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1. Corrections

(1) p.104, l.19 and l.24: $(b-a)$ should be $(b-a)^{-1}$.
(2) p.112, l.7: $M_t^{(n)} = E(M_1^{(n)}|\mathcal{F}_t)$ (subindex t was missing).
(3) p.112, l.12: $\mathcal{M}_t^{(n)} = p_n^{(n)} M_t^{(n)} + \cdots + p_{N_n}^{(n)} M_t^{(N_n)}$ (subindex t was missing).
(4) p.134, l.22: $...l = 0, 1, ..., 2^n - 1, ...$
(5) p.137, l.25: in the last line of (7.1.4) the last summand is $S_n(t_{l-1})S_n(t_{m-1})$, the subindex n of S is missing.
(6) p.141, l.5,8,9: E before exp should be deleted (since the expressions in the exponents are not random).
(7) p.146, l.12: $\in \mathcal{C}$ is missing, i.e. it should be $C = \cup_{j=1}^{\infty} C_j \in \mathcal{C}$.
(8) p.153, l.14: delete $E($ before $\int_0^s f(u)dW(u)$.
(9) p.153, l.25: replace $\mathcal{F}_w$ by $\mathcal{A}_w$.
(10) p.156, l.20: write the factor 2^{2n} before $E\int_0^T (f_{n+1}(t) - f_n(t))^2 dt$.
(11) p.157, l.5: replace $f^{(n)}$ by f_n in both places.
(12) p.157, l.10: In fact, if (7.2.1) holds true and f_n is a sequence of simple functions such that $E\int_0^T (f(s) - f_n(s))^2 ds \to 0$ as $n \to 0$, then f_n is a fundamental sequence in $L^2([0,T] \times \Omega, \ell \times P)$, where ℓ is the Lebesgue measure. By the Itô isometry $\int_0^t f_n(s)dW(s)$ is a fundamental sequence in $L^2(\Omega, P)$ for each $t \in [0,T]$, and so it converges in L^2 and its limit must be $\int_0^t f(s)dW(s)$ since we showed that along a subsequence it converges to this stochastic integral. In this sense the construction of stochastic integrals does not depend on approximating sequences of simple functions.
(13) p.158, l.22: replace $[2nt]$ by $[2^n t]$.
(14) p.161, last line: replace 7.2.2(iii) by 7.2.2(ii).
(15) p.165, l.8 and l.11: M_τ^2 and M_T^2 should be $M^2(\tau)$ and $M^2(T)$, respectively.
(16) p.168, l.27: it should be "... $I^M(\Phi_n)(t)$, $n \geq 1$ is also a Cauchy sequence ...".
(17) p. 172, 2nd line in (7.3.3): in $\sum_{i,j=1}^d$ the upper limit d was missed.
(18) p. 173, l.16,17: employing the same arguments as at the end of Section 7.2.2 we can restrict ourselves to functions f and g satisfying $E\int_0^T f^2(s)ds < \infty$ and $E\int_0^T |g(s)|ds < \infty$, and so we approximate them by simple functions f_n and g_n having corresponding moments finite, as well.

(19) p.180, l.4: replace $\frac{\partial^2 F}{\partial x^2}(s,x)$ by $\frac{\partial^2 F}{\partial x^2}(s,X(s))$.
(20) p.182, l.7: local martingal ("local" is missed).
(21) p.183, l.26: in the 2nd line of (7.4.9) replace $Ee^{\frac{1}{2}M_{\varepsilon^2}(t)}$ by $Ee^{\frac{1}{2}\langle M_{\varepsilon^2}\rangle(t)}$.
(22) p.183, last line: replace $EX_\varepsilon^r(T)$ by $EX_\varepsilon^r(T\wedge\tau_n)$.
(23) p.184, l.8: in the last line of the 4 lines formula replace $Ee^{\frac{1}{2}M_{\varepsilon^2}(T)}$ by $(Ee^{\frac{1}{2}M_{\varepsilon^2}(t)})^{1/q}$.
(24) p.185, l.4,6,7,8: replace $M(t)$ and $M(s)$ by $N(t)$ and $N(s)$, respectively, since M is reserved for the stochastic integral appearing in Corollary 7.4.1. On lines 9 and 10, M appears correctly.
(25) p.190, l.20: $R_n(t)=E\sup_{s\in[0,t]}|Y^{(n+1)}(s)-Y^{(n)}(s)|^2$, the square was missed.
(26) p.190, the last expression in the 2nd line of the last formula: $4C^2\int_0^t R_{n-1}(s)ds$, C^2 was missed.
(27) p.191, 2nd line of (7.5.14): replace 32 by 64.
(28) p.192, l.11: replace $Y^{(k)}$ by $Y^{(k)}(s)$ in two places.
(29) p.192, l.25: $\int_0^t\sigma(s,Z(s))dW(s)$, the integral limits (from 0 to t) were missed.
(30) p.195, l.4: replace σ_{ik} and σ_{jk} by $\sigma_{i,k}$ and $\sigma_{j,k}$, respectively.
(31) p.195, last line: delete $=0$.
(32) p.197. l.14: replace m by n i.e it should be $M_{t\wedge\tau_n}$.
(33) p.197, l.29: replace $\int_0^T\Phi(s)ds$ by $\int_0^T\Phi(s)dW(s)$.
(34) p.198, l.26,27: replace s by t in this two lines formula.
(35) p.199, l.9: replace $\frac{1}{2\sigma}$ by $\frac{1}{2\alpha}$ in the 2nd line of the formula.

2. Comments

(1) p.131: In Corollary 6.2.2 it suffices to assume (in addition to right continuity) that the processes Z_t and $-Y_t$ are left upper semi-continuous (i.e. that Y_t is left lower semi-continuous) which means that

$$\limsup_{s\uparrow t} Z_s\le Z_t \quad\text{and}\quad \liminf_{s\uparrow t} Y_s\ge Y_t.$$

Then $R(\eta,t)$ is also left upper semi-continuous in t for any stopping time η. Since $\tau_\zeta^\varepsilon\uparrow\tau_\zeta^*$ as $\varepsilon\downarrow 0$ we obtain

$$\limsup_{\varepsilon\downarrow 0} E(R(\eta,\tau_\zeta^\varepsilon)|\mathcal{F}_\zeta)\le E(\limsup_{\varepsilon\downarrow 0} R(\eta,\tau_\zeta^\varepsilon)|\mathcal{F}_\zeta)\le E(R(\eta,\tau_\zeta^*)|\mathcal{F}_\zeta).$$

Since $Y_t\ge Z_t$ and Y_t is left lower semi-continuous, the function $R(t,\eta)$ is left lower semi-continuous in t for any stopping time η, i.e.

$$\liminf_{s\uparrow t} R(s,\eta)\ge R(s,\eta)\ge R(t,\eta),$$

and so

$$\liminf_{\varepsilon\downarrow 0} E(R(\sigma_\zeta^\varepsilon,\eta)|\mathcal{F}_\zeta)\ge E(\liminf_{\varepsilon\downarrow 0} R(\sigma_\zeta^\varepsilon,\eta)|\mathcal{F}_\zeta)\ge E(R_\zeta^*,\eta)|\mathcal{F}_\zeta).$$

Since for any $\eta\in\mathcal{T}_{\zeta T}$,

$$\liminf_{\varepsilon\downarrow 0} E(R(\sigma_\zeta^\varepsilon,\eta)|\mathcal{F}_\zeta)\le V_\zeta\le\limsup_{\varepsilon\downarrow 0} E(R(\eta,\tau_\zeta^\varepsilon)|\mathcal{F}_\zeta),$$

we obtain

$$E(R(\sigma_\zeta^*,\eta)|\mathcal{F}_\zeta)\le V_\zeta\le E(R(\eta,\tau_\zeta^*)|\mathcal{F}_\zeta),$$

completing the proof.

(2) p.214: In view of the above modification of Corollary 6.2.2 the conditions of Theorem 8.2.3 concerning the existence of a hedging investment strategy (π^*, σ^*) with the initial capital equal to the price V^* of a game option can also be relaxed so that the payoff processes $Y_t \geq Z_t$ should be cádlág and in place of left continuity the processes Z_t and $-Y_t$ only need to be left upper semi-continuous.

(3) p.290: Recently Yan Dolinsky constructed an example showing that in general there exists no shortfall risk minimizing strategy for continuous time Israeli contingent claims in a Black–Scholes frictionless market (see Y. Dolinsky, On shortfall risk minimization for game options, arXiv: 2002.01528).