Large Deviations for Stochastic Processes
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Errata

- On page 12, line 6, a missing ")" in "$\partial_j f(x$", and a redundant ")" in "$\partial_i\partial_j f(x))$".
- The proof of Lemma 7.8 on page 114 contains an error. The assertion that the conditions of that lemma imply $\inf_x g(x) > -\infty$ is not in general correct. For example, let $f(x) = g(x) = -x^2$ and $\epsilon_0 = 1$.

  The lemma, however, is correct as stated.

  As in the incorrect proof, let x_n and $0 < \epsilon_n < \epsilon_0$ satisfy $\epsilon_n \to 0$ and

$$\sup_x f(x) < f(x_n) - \epsilon_n g(x_n) + \epsilon_n^2. \tag{0.1}$$

  That is, $\varphi(0) \leq \sup_x f(x) < \varphi(\epsilon_n)$ where $\varphi(\epsilon) = f(x_n) - \epsilon g(x_n) + \epsilon^2$. By continuity of φ, we can assume that $\sup_x f(x) \leq \varphi(\epsilon_n) \leq \sup_x f(x) + n^{-1}$. We have

$$\lim_{n\to\infty} (f(x_n) - \epsilon_n g(x_n)) = \sup_x f(x). \tag{0.2}$$

  Then

$$\limsup_{n\to\infty} g(x_n) = -\liminf_{n\to\infty} \frac{\sup_x f(x) - f(x_n)}{\epsilon_n} \leq 0. \tag{0.3}$$

  Next, we show that

$$\lim_{n\to\infty} f(x_n) = \sup_x f(x). \tag{0.4}$$

  By (0.3), either $\limsup_{n\to\infty} g(x_n) = 0$ and (0.4) holds, or $\limsup_{n\to\infty} g(x_n) < 0$. In the latter case, let $0 < \epsilon < \epsilon_0$. Then

$$\sup_x (f(x) - \epsilon g(x)) \geq f(x_n) - \epsilon_n g(x_n) - (\epsilon - \epsilon_n) g(x_n),$$

  and hence, by (0.2),

$$0 < -\limsup_{n\to\infty} g(x_n) \leq -\liminf_{n\to\infty} g(x_n) \leq \frac{\sup_x (f(x) - \epsilon g(x)) - \sup_x f(x)}{\epsilon}.$$

  It follows that $\lim_{n\to\infty} \epsilon_n g(x_n) = 0$ and $\lim_{n\to\infty} f(x_n) = \sup_x f(x)$ completing the proof of Part (a) of Lemma 7.8.

  Part (b) can be proved similarly.

- Page 130, line -2, $\eta_n(z_n) \to yx$ should be $\eta_n(z_n) \to x$.
- In Lemma 9.16 on page 176, (9.46) must holds for all $x, p \in R^d$ with $p \neq 0$. Additionally, one must assume $H_{\ddagger}^*(x, 0) < \infty$ for each $x \in R^d$.
- Page 190, the ρ^p in (9.84) should be $\dot{\rho}^p$.

- In Lemma 10.5 on page 210, (10.20) must hold for all $x, p \in R^d$ with $p \neq 0$.
- Lemma 12.5 on page 289 should assume Conditions 11.21.3 and 11.21.4 (not 11.34.3 and 11.34.4 which don't exist).
- On page 340, lines 11 and 12, the $h(X(t), z)$ should be $h(X(s), z)$ and the $U(t)$ should be $U(s)$.
- On page 391, line -6, the Ψ_n should be Ψ_ϵ.