Corrections for the book NONLINEAR PROGRAMMING: 3RD EDITION, Athena Scientific, 2016, by Dimitri P. Bertsekas

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Corrections to the 1ST PRINTING

p. 196 (14) “in the case” is repeated twice.

p. 216 (-4) Add +∇^2_u L(φ(u), u, p(u))' at the end of Eq. (2.193).

p. 418 (-4) Rewrite the last sentence as follows:
The optimal solution is \( x^* = (0, 0) \), and again it can be seen that there is no Lagrange multiplier \( \lambda^* \) such that
\[
\left( \nabla f(x^*) + \lambda^* \nabla h(x^*) \right)'(x - x^*) = x_1 + \lambda^* x_2 \geq 0, \quad \forall \ x \in X.
\]

Here, condition (2) of Prop. 4.3.18 is satisfied, but condition (1), is violated.

p. 456 (-7) The first equation of the proof of Prop. 5.1.4 is flawed. Replace the first 7 lines of the proof with the following:

Proof: Let \( \lambda_{\bar{x}, \bar{\epsilon}} \) and \( \lambda_{\bar{X}, \epsilon} \) correspond to \((\bar{x}, \bar{\epsilon})\) and \((\bar{x}, \epsilon)\) via Eq. (5.7), so that from Eqs. (5.5)-(5.6), we have
\[
q(\bar{x}, \bar{\epsilon}) = \frac{\bar{X}(c - \lambda_{\bar{x}, \bar{\epsilon}})}{\bar{\epsilon}} - \epsilon, \quad q(\bar{x}, \epsilon) = \frac{\bar{X}(c - \lambda_{\bar{x}, \epsilon})}{\epsilon} - \epsilon.
\]

Denoting \( \theta = \delta n^{-1/2} \) and using the minimization property of the second equation in p. 455, we have
\[
\|q(x, \epsilon)\| \leq \left\| \frac{\bar{X}(c - \lambda_{\bar{x}, \epsilon})}{\epsilon} - \epsilon \right\|
= \left\| \frac{\bar{X}(c - \lambda_{\bar{x}, \epsilon})}{(1 - \theta)\epsilon} - \epsilon \right\|
= \frac{1}{1 - \theta} \left\| \frac{\bar{X}(c - \lambda_{\bar{x}, \epsilon})}{\epsilon} - (1 - \theta)\epsilon \right\|
\leq \frac{1}{1 - \theta} \left( \left\| \frac{\bar{X}(c - \lambda_{\bar{x}, \epsilon})}{\epsilon} - \epsilon \right\| + \theta\|\epsilon\| \right)
= \frac{1}{1 - \theta} \left( \|q(\bar{x}, \epsilon)\| + \theta\|\epsilon\| \right)
= \frac{1}{1 - \theta} \left( \|q(\bar{x}, \epsilon)\| + \theta n^{1/2} \right).
\]
\[ \leq \frac{1}{1 - \theta} (\|q(x, \epsilon)\|^2 + \delta) \]
\[ \leq \frac{\gamma^2 + \delta}{1 - \theta}. \]