Matrix Mathematics  
Errata and Addenda for the First Edition  

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May 12, 2010  

This document contains an updated list of errata for the first edition of Matrix Mathematics. Please email me if you discover additional errors, and I will include them in future updates.

All of these errors are corrected in the second edition, which is also greatly expanded relative to the first edition.

- Page 32, line 6: change “either $\mathbb{F} = \mathbb{C}$” to “either $\mathbb{F} = \mathbb{R}$”
- Page 52, Fact 2.10.15: $iii)$ is true with “$\subseteq$” replaced with “$=$”, $iv)$ is true with “$\leq$” replaced with “$=$”, and the last identity in $v)$ can be omitted
- Page 83, Definition 3.1.3: delete “$l \triangleq \min\{n, m\}$” and replace “$l$” in $iii)$ with “$\min\{n, m\}$”
- Page 94, Fact 3.5.22: delete “$A + A^*$”, delete “and $A - A^*$”, and replace “are skew” with “is skew”. Append “Now assume that $n = m$. Then, $A + A^*$ is Hermitian, and $A - A^*$ is skew Hermitian.”
- Page 96, Fact 3.5.26: replace “$\mathbb{R}^3$” by “$\mathbb{R}^{3 \times 3}$”
- Page 101, Fact 3.7.22: replace “$(s - j)/(s + j)$” with “$(s - j)/(s + j)$”
- Page 101, Fact 3.7.23: replace “$B \triangleq (I - A)(I + A)^{-1}$” with “$B = \lambda(I - A)(I + A)^{-1}$”
- Page 107, Fact 3.8.23, condition $iii)$: change “For all” to “For all nonzero”
- Page 115, Fact 3.12.8: replace $J_n$ by $J_{2n}$
- Page 128, Definition 4.3.4: replace $P \in \mathbb{F}^{n \times n}[s]$ by $P \in \mathbb{F}^{n \times m}[s]$  
- Page 137, line 4: replace the second instance of $\lambda_1$ with $\lambda_2$
- Page 141, Fact 4.8.2: replace “$\mathbb{F}^n$” with “$\mathbb{F}^n[s]$”
- Page 151, Fact 4.9.16: replace $I_n$ by $I_{2n}$
Page 151: Divide the left hand side of the last displayed equation by $\| A^k x_0 \|$.

Page 156, Fact 4.11.1: In statement $\text{ii}$, replace “nonnegative” by “nonzero nonnegative”.

Page 172: Replace “are $B_i \triangleq [\lambda_i]$ for all $i = 1, \ldots, r$ and $\hat{B}_i \triangleq [\nu_i \omega_i]$ for all $i = 1, \ldots, l$” with “satisfy $B_i \triangleq [\lambda_i]$ for all $i = 1, \ldots, r$ and $\text{spec}(\hat{B}_i) = \{\nu_i + j\omega_i, \nu_i - j\omega_i\}$ for all $i = 1, \ldots, l$.” Also, replace “[367, p. 152]” with “[367, p. 82].”

Page 181, Proposition 5.5.25: delete statement $\text{xviii}$.

Page 192, Fact 5.9.16: replace “$A, B$” with “$A, B \in$”.

Page 200, Fact 5.10.25: replace “$\sqrt{ac}$” by “$2\sqrt{ac}$”.

Page 201, Fact 5.11.4: In the last displayed equation change “$\lambda_{n-i}$” to “$\lambda_{n-i+1}$”.

Page 201, Fact 5.14.13: change $x^*_i$ to $x^T_i$ twice.

Page 206, Fact 5.14.35: delete “and assume that $A$ is skew symmetric.”

Page 226, Proposition 6.1.7: In $\text{viii}$, change $A^t \in \mathbb{F}^{m \times m}$ to $A^t \in \mathbb{F}^{m \times n}$.

Page 226, last line: change $x \in \mathbb{F}^n$ to $x \in \mathbb{F}^m$.

Page 236, Fact 6.4.16: change $B \in \mathbb{F}^{m \times m}$ to $B \in \mathbb{F}^{m \times n}$.

Page 240, Fact 6.4.29: change $D \triangleq B + C + C$ to $D \triangleq B + C^*$.

Page 240, Fact 6.4.30: change $(1 + b^* A^t b)$ to $(1 + b^* A^t b)^{-1}$.

Page 248, Definition 7.1.2: change “of $A$” to “of $A$ and $B$”.

Page 256, Fact 7.4.24: replace $P_{n,l}$ with $P_{l,n}$.

Page 257, Fact 7.5.6: change to

Let $A \in \mathbb{F}^{n \times n}$, let $B \in \mathbb{F}^{m \times m}$, assume that $A$ is positive definite, and define $p(s) \triangleq \det(I - sA)$, and let $\text{mroots}(p) = \{\lambda_1, \ldots, \lambda_n\}_m$. Then,

$$\det(A \oplus B) = (\det A)^m \prod_{i=1}^n \det(\lambda_i B + I).$$

Page 257, Fact 7.5.7: change to

Let $A, C \in \mathbb{F}^{n \times n}$, let $B, D \in \mathbb{F}^{m \times m}$, assume that $A$ is positive definite, assume that $C$ is positive semidefinite, define $p(s) \triangleq \det(C - sA)$, and let $\text{mroots}(p) = \{\lambda_1, \ldots, \lambda_n\}_m$. Then,

$$\det(A \otimes B + C \otimes D) = (\det A)^m \prod_{i=1}^n \det(\lambda_i D + B).$$
Let $A, D \in \mathbb{F}^{n \times n}$, let $C, B \in \mathbb{F}^{m \times m}$, assume that $\text{rank } C = 1$, and assume that $A$ is nonsingular. Then,
\[
\det (A \otimes B + C \otimes D) = (\det A)^m (\det B)^n \det [B + (\text{tr} CA^{-1}) D].
\]

Page 276, Corollary 8.4.15: replace “$p > 1$ or $p < n$” with “$p \in (1, n)$”.

Page 284, Proposition 8.5.15: in (xvii) change “tr” to “-tr” and append “$r \in (0, 1)$”.


Page 301, Fact 8.9.3 and Fact 8.9.4: replace “$A, B, C \in \mathbb{F}^{n \times m}$” by “$A \in \mathbb{F}^{n \times n}, B \in \mathbb{F}^{n \times m}$, and $C \in \mathbb{F}^{m \times m}$”.

Page 310, Fact 8.10.25: replace “$A^{p/2} B^{p/2} A^{p/2}$” with “$A \log(A^{p/2} B^{p/2} A^{p/2})$” twice.

Page 311, Fact 8.11.3: Replace the second “real” with “positive” and the third “real” with “nonnegative.”

Page 315, Fact 8.11.26: replace $\det(C - B^*C + B)$ with $\det(C - B^*A^{-1}B)$.

Page 316, Fact 8.11.31: Reverse the determinant inequality.

Page 319, Fact 8.12.14: Replace “$x^T Ax \geq 0$ for all” by “$x^T Ax > 0$ for all nonzero” and replace “$x^T Ax \leq 0$ for all” by “$x^T Ax < 0$ for all nonzero”.

Page 323, Fact 8.14.1: append to the first sentence “and let $\text{mspec}(A) = \{\lambda_1, \lambda_2\}$”.

Page 326, Fact 8.14.12: Replace $\sigma_{\max}(A^{1/2}BA^{1/2})$ with $\sigma_{\max}(A^{1/2}B^{1/2})$.

Page 329, Fact 8.14.15: The inequality should read
\[
\sigma^2_{\max}(A_{12}) \leq \sigma_{\min}(A_{11}) \sigma_{\min}(A_{22}),
\]
which is sufficient but not necessary.

Page 341, Fact 8.17.5: replace “log majorizes” by “weakly log majorizes.”

Page 342, Fact 8.17.6: replace “$e^t$” by “$t$.”

Page 344, proof of Proposition 9.1.2: replace the second “$|y| \leq |x|$” by “$|x| \leq |y|$”.

Page 345, Proposition 9.1.5: replace “$1 \leq p < q \leq \infty$” by “$1 < p < q < \infty$.”

Page 348, line 1: replace “$1 \leq p \leq q$” by “$1 \leq p < q < \infty$.”
• Page 528, equation (12.13.3), change $-BD^{-1}$ to $BD^{-1}$

• Page 539, Proposition 12.16.13, \(ii\): replace “\(q\)” with “\(p\)” twice

• Page 541, line -2: replace “a stabilizing solution” with “the stabilizing solution”