Errata for Convex Optimization.

If you find an error in the book not listed here, please do let us know about it.

Don't let the large number of typos listed below worry you. They are all quite minor and harmless.

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- page 38, example 2.10. missing final period in first sentence.
- page 46, section 2.5.1. add "nonempty" to "C and D are two convex sets".
- page 62, exercise 2.16. "R^{m x n}" should be "R^{m + n}".
- page 88, line 1. changed "provided $g(x)<-\infty$ for some x ..." to "provided $g(x) > -\infty$ for all x."
- page 114, exercise 3.9 (b). On line 2 and in the hint, replace "if and only if" with "if".
- page 114, exercise 3.10. f_0 should be f.
- page 119, exercise 3.29. Add that f is convex.
- page 121, exercise 3.44 (a). On the first line, replace "if and only if" with "if".
- pages 318--19. Three occurrences of "statistical robust approximation" should be "stochastic robust approximation".
- page 314, bottom paragraph. subscript "corr" should be "cor".
- page 385, section 7.5.1. "comparable to n" should be "comparable to p".
- page 394, exercise 7.6. "has mean b" should be "has mean b/a".
- page 439, equation (8.32). some i's and j's are wrong in the third and fourth inequalities.
- page 442, alignment constraints. w_i and w_j should be h_i and h_j.<\li>
- page 595, below (11.36). Missing section symbol in 11.5.4.<\li>
- page 598, middle. Missing cones in subscript in definition of domain of ϕ.<\li>
- page 647, middle of page. remove "in" from "if $-A$ is in nonnegative definite".

Errata corrected in seventh printing (July 2009).

- page 141, example 4.6. "where a_i^T,...,a_m^T" should be "where a_1^T,..,a_m^T".
- page 169, definition of "K_i". "R^{k_i+1}" should be "R^{n_i+1}".
- page 177, line 6. "||Fv||_2^2" should be "||F^Tv||_2^2".
- page 184, end of first paragraph. Switch F_i and F_j.
- page 208, exercise 4.58. "The variables are c_1,...,cT" should be "The variables are c_0,...,c_T", and the sum defining U should start at t=0.
- page 212, bottom equation: T+1 should be T.
- page 218, line 9. "g_i(x)" should be "h_i(x)".
- page 249, line 4. "dom f" should be "dom f_0".
- page 250, line 13. "p^*:R^m x R^p" should be "p^*:R^m x R^p -> R".
- page 255, the expression of L following (5.66): "y0,y1,...,ym" should be included in the argument list.
- page 270, 6 lines above the example: "strict" should be "nonstrict".
- page 310, example 6.4. Switch m and n in first three lines.
- page 314, line -4. "Figure 6.14 show" should be "Figure 6.14 shows".
- page 326, last equation. "S_n" should be "S_m".
- page 336, line -3. "in in" should be "in".
- page 353, first equation. "a_i^Tx-b_i" should be "b_i-a_i^Tx".
- page 376, bottom equation. replace "z" with "X".
- page 386, first line. should be "for which a_j=v_i".
- page 479-480, convergence analysis. Some gamma's should be gamma tilde's.
- page 522, equation (10.3). "(1/2)x^TPx+..." should be "f(x)=(1/2)x^TPx+..."

- page 530, middle. "nabla f(x)^2" should be "nabla^2 f(x)".
- page 530, line -16. switch x^0 and z^0.
- page 530, line 9. f(Fx+hat x) should be f(Fz+hat x).

Errata corrected in sixth printing (May 2008).

- page 64, exercise 2.31d. last "K" should be "cl K".
- page 95, last sentence. "A function is quasilinear if its domain, and every level set {x|f(x)=alpha} is convex" should be "If f is quasilinear, then its domain, and every level set {x|f(x)=alpha} is convex"
- page 98, second displayed equation. "PV(x,r) >= 0 for 0 <= r <= R" should be "PV(x,r) > 0 for 0 <= r < R". On line -3 of the example, "PV(x,r) >= 0" should be "PV(x,r) > 0" and "0 <= r <= R" should be "0 <= r < R". On line -2 of the example "halfspace" should be "open halfspace".
- page 109, last bullet in example 3.46. "det X is increasing on S^n_+" should be "det X is increasing on S^n_++ and nondecreasing on S^n_+".
- page 114, exercise 3.5. added short hint.
- page 120, exercise 3.34e. add "bounded" to assumptions on C.
- page 121, exercise 3.41. replaced with new problem.
- page 123, exercise 3.54c. add "for x<0" after "Conclude that".
- page 124, end of exercise 3.55. Last inequality should be h'(x)<0.
- page 124, exercise 3.58. "viewed as function" should be "viewed as *a* function".
- page 130, line after equation (4.3). Should be "where alpha_i>0, i=0,...m".
- page 140, two lines below (4.22). "Suppose x is feasible" should be "Suppose x is optimal".
- page 144, equation (4.25). "for all y \in X" should be "for all y\in X\{x}".
- page 167, equation above section 4.6. "s_3v_3<=lambda v_3" should be "s_3v_3<=lambda v_4"; also, "1/2<=c_i<=2" should be "1/2<=c_i/c_i^nom<=2".
- page 191, exercise 4.6. Middle bullet at bottom of problem should be "f_1,...f_m are nondecreasing in x_r", not "f_1,...f_m are nonincreasing in x_r".
- page 199, exercise 4.29. Gave the required condition, instead of asking for it.
- page 199, exercise 4.31. Missing lower bound on aspect ratio, Smin <= h_i/w_i, which is in original problem (p165).
- page 201, exercise 4.39, last equation. Bottom left entry in matrix \tilde G should be b^T, not b.
- page 209, exercise 4.60, bottom equation, middle term. "i=1" should be "t=1".
- page 256, line 6. "lambda_i f_i^*(nu_i/lambda_i)=-infty" should be "lambda_i f_i^* (nu_i/lambda_i)=infty".
- page 263, line below (5.87). change "inequalities" to "equalities and inequalities".
- page 267 (line -5), page 269 (equation (5.98) and line -6), page 270 (line 2, equation (5.102) and line -11): "K_i^\star" should be "K_i^*".
- page 267 (line 9). "the both sums" should be "the two sums".
- page 269 (line -3). "We now assume that the functions ...".
- page 277, exercise 5.14, second equation. "f(x)" should be "f_0(x)".
- page 287, line 7 of exercise 5.43. The constraint "||ui||_2 <= vi" in the dual problem should be "||ui||_2 <= -vi".
- pages 314 and 317. The order of the three plots in figure 6.14 should be reversed to be consistent with figures 6.10 and 6.12. The references to 'top' and 'bottom' in the caption and at the end of page 314 must be changed accordingly.
- page 319, line 15. "variance delta" should be "variance delta/m".
- page 346, line 2. "log(1-x^2)" should be "log(1-u^2)".
- page 362, line 11. "most unequivocal" should be "most equivocal".
- page 365, line 7. "we have mistaken θ for $\hat \theta$" should be "we have mistaken $\hat \theta$ for θ".
- page 366, line 9 and -2. in both lines, "mistaking $\theta=j$ for $\theta=i$" should be "mistaking $\theta=i$ for $\theta=j$".
- page 387 bottom. (not really a typo.) explain that e_k in bottom equation is unit vector, not kth

component of e (the estimation error vector)

- page 420, 3 lines below (8.19). "analytic center in unique" should be "analytic center is unique".
- page 426, first and third lines following (8.25). in both cases, "a^z+b$ should be a^Tz-b.
- page 427, first line of 2nd paragraph. remove "the" from "The first term is the proportional".
- page 429, caption of figure 8.12. "circles" should be "open circles" and "squares" should be "filled circles" (see previous figures). also, last two words should be "dashed lines", not "solid lines".
- page 431, caption of figure 8.14. "x_1,...x_N" and "y_1,...y_M" should be "x_1,...,x_N" and "y_1,...,y_M" (missing second commas).
- page 434, equation above example 8.6. bottom choice righthand side should be $|z|>\gamma$.
- page 440, 3rd paragraph. "Similarly, there is ... path in H" should be "Similarly, there is ... path in V".
- page 442, end of paragraph on Similarity constraints. second occurence of "or height)" should be " (or height)" (missing left parenthesis).
- page 443, last equation has a few misplaced parentheses. $(x_j-(x_i+w_i)^2+d_v^2) \leq D^2_{ij}$ should be $(x_j-(x_i+w_i))^2+d_v^2 \leq D^2_{ij}$.
- page 449, problem 8.11, 2nd paragraph. "a_1,...,a_m in R"
- page 479, equation in step 1. pf example 9.2. third term in denominator should be "gamma_i", not "gamma_k".
- page 479, bottom of first paragraph in section 9.4.3. "see \S A.1.2" should be "see \S A.1.4".
- page 481, line -10. "Figure 9.13 show" should be "Figure 9.13 shows."
- page 488, line -3. "x^k" should be "x^{(k)}".
- page 504, second equation from bottom of page. \alpha \beta should be - \alpha \beta.
- page 511, example 9.9. "where \phi_i" should be "where \psi_i".
- page 515, exercise 9.7. "Let Delta_sd" should be "Let Delta_nsd".
- page 519, exercise 9.28, last line. "x^T Ai" should be "x^T Ai x".
- page 529, line -7. "equality constrained constrained problems" should be "equality constrained problems."
- page 559, last line. "... problem described in exercise 4.60, without the constraint x >= 0".
- page 597, equation in example 11.5. remove "diag".
- page 625, exercise 11.9. Modified to remove reference to exercise 3.41.
- page 637, middle of page. "The dual of the l1 norm is the linfty norm" should be "The dual of the linfty norm is the l1 norm".
- page 640. re-arrange and re-phrase definition of derivative.
- page 671, first equation. top right entry in right matrix, D^{-1/2}u^T, should be D^{-1/2}u.
- page 677, example C.3. "the product A_{11}^{-1}A_{21}" should be "the product A_{11}^{-1}A_{12}".

Errata corrected in third printing (January 2006).

- page 7, line below equation (1.7). "The details will be given in chapter 4" should be "The details will be given in chapter 6".
- page 43, example 2.14: 'than' should read 'that' in lines 3 and 5.
- page 65, exercise 2.37b. Delete "known as the Markov-Lucacs theorem".
- page 88, line 15. This assumes that the infimum in (3.16) is attained.
- page 97, line -3 of example 3.33. Insert "is" before "equivalent".
- page 103, line -13: delete period after "otherwise".
- page 117, exercise 3.23 (a), last line: `is convex on {(x,t) | t>0}'.
- page 157, 4th line below (4.37), righthand side of eqtn `\sup \{u^T P_i x' should be `\sup \{u^T P_i^T x'.
- page 159,160 (1/K) in gradient expression should be K! in last eqn, differences should be multiplied by K. not divided. on p160, differences should be mult by K; also we should multiply obj by (1/K^2).
- page 199, line -10: `di' should be in the numerator: E*wi*hi^3*di/(6*F) <= 1.

- page 201, exercise 4.39 (b): second "minimize" should be "subject to".
- page 207, exercise 4.55, 2nd part of problem: add requirement that scalarized problem has unique solution.
- page 208, line 2. In the first sum the index i should run from 1 to m; in the second sum, j should run from 1 to n.
- page 209, line 3. Replace `know' by `known'.
- page 228, third equation. remove "2" in term "2q_i^Tx".
- page 229, line 15. Added explicit assumption A\not\succeq 0.
- page 232, equation (5.37). R^p should be {0}.
- page 243 last equation (5.49). lambda_i^\star\succeq 0 should be lambda_i^star \geq 0.
- page 245 middle. "implies that \nu=1/(\alpha_i+x^\star_i)".
- page 247, line 6 from the bottom. 'lambda2' should read 'lambda3'.
- page 253 first equation: \partial p^\star(0,0) should be \partial p^\star(0) (since there are no equality constraints here).
- page 255 last line of example 5.6. "we use fact the conjugate" should be "we use the fact *that* the conjugate".
- page 255 last line (twice) and page 256 (lines 5, 6 and eq. 5.67): f^\star should be f^*.
- page 260 bottom equation. subscript "x\in D, t" should be "x\in D, s".
- page 265, line 12. "weak duality," can be deleted.
- page 268 8th line from bottom. 'Since F(x^*)\succeq 0' should be 'Since F(x^*)\preceq 0'.
- page 269 8th line from bottom '\lambda_i \geqKst' missing RHS 0.
- page 274, Exercise 5.6: bottom of 1st paragraph. "how much larger is ||.||_2 than ||.||_\inf?" should be "...is ||.||_\inf than ||.||_inf?"
- page 287, Exercise 5.43, line below dual: "data are c \in \reals^n, ..." should be "data are f \in \reals^n..."
- page 316 Figure 6.12. Labels \hat{x}_i shoud not have a subscript; none of the similar figures in chapter 6 have that kind of subscript.
- page 327 middle: "piecewise-linear linear".
- page 375, equation 7.17: the sum in the second constraint runs from 0 (not "o") to n.
- page 388, sentence above (7.30). "be expressed is" should be "be expressed as".
- page 393 Exercise 7.2: l5: "\leq a" should be "\leq \alpha".
- page 483, first line of the caption of figure 9.15. P_1 should be P_2.
- page 520, problem 9.32, 10th line from the bottom. missing x in the search direction \Delta_gn.
- page 522, line -8. '... is unbounded below or infeasible'.
- page 523, second line above example 10.1. "=\tilde f(z^star)=" should be "=\nabla \tilde f(z^star)=".
- page 525, equation above (10.9). "-diag(1/x_1,...1/x_n)" should be "-(1/x_1,...1/x_n)".
- page 526, second paragraph. "section symbol 10.2' should read 'section symbol 10.1.1'
- page 537, line 18. Replace "do not hold" with "may not hold".
- page 537, line -3. ||r(y)||_2 should be ||r(y^(0))||_2.
- page 543. at the end of the caption for Figure 10.1 there is an extra sentence fragment.
- page 553. the (N-1,N) block be inv(Q_{N-1})*A_{N-1}^T and the same for the (N,N-1) block, i.e., index of Q should be N-1 instead of N.
- page 572, line 9. insert "(factor of)" before \mu.
- page 578, 2nd to last equation. A\nu_nt should be A\Delta x_nt = 0.
- page 600 line -6. righthand side should be tr((-F(x))^{-1}Fi).
- page 600 line -4, second term on the left should be tr((-F(x))^{-1}Fi).
- page 610, last line before subsection. A(x+s\Delta x_pd) = 0 should be A(x+s\Delta x_pd) = b.
- page 614 second line of figure 11.21 caption. \eta should be \hat \eta
- page 620 4th equation and below. U is concave, so we need to minimize -tU+barrier, not tU+barrier. then, below, D_0 should be D_0=-diag().
- page 624 bottom of exercise 11.5 "point point".
- page 637, second last paragraph under Dual Norm, "q = p/(1-p)" should be "q=p/(p-1)".
- page 682, last line. "The factors Q and R are usually dense" should be "The factor Q is usually dense".

- pages 685-696. Miscellaneous minor corrections and updates to the references.

Errata corrected in second printing (September 2004).

- page 47, figure 2.18. E2 is not minimal.
- page 63, exercise 2.20 requires the assumption that Ax=b is solvable.
- page 118, line -7: replace n by k in the upper limit of the product on the the right.
- page 118, last line: replace kxk by ixi.
- page 128, line 14: replace f(x) by f_0(x).
- page 316, figure 6.12: replace `smoothes' with `smooths'.
- page 352, line -9: replace (1/2)\log(2\pi\sigma) by (m/2)\log(2\pi\sigma^2).
- page 387, last equation: replace matrix inequality with [sum_i=1^p lambda_i v_i*v_i^T e_k; e_k^T u_k] >= 0, k=1,...,n.
- page 396, line -2: replace "lower bound" by "upper bound".
- page 444 figure 8.20 in caption. "figure 8.18" should be "figure 8.19".
- page 518, line -8: delete last ")".
- page 541, line -14: replace `Dr = nabla f^{-1} is bounded' by `Dr = nabla f has bounded inverse'.
- page 555, line -8: replace `two matrices in S^n' by `two matrices in\reals^{n\times n}'. Replace (1/2)p^2n^2 by p^2n^2.
- page 555, line -3: replace (1/2)p^2n^2 by p^2n^2
- page 692 [MZ89]: replace Zafirou by Zafiriou.