Corrections and Minor Revisions of *Mathematical Methods in the Physical Sciences*, third edition, by Mary L. Boas (deceased)

Updated March 29, 2018 by Harold P. Boas

This list includes all errors known at the stated time of update. In addition to corrections, a few minor revisions for clarity are included. This errata list can be found at

`http://www.math.tamu.edu/~boas/Boas_MathematicalMethods_errata.pdf`.

Please send any additional corrections to `boas@tamu.edu`.

Page	**Location**	**Correction**
viii	Line 20	For "futher" read "further".
ix	Line 15	The opening quotation marks around "To the Student" are reversed.
34	Last line	6^2 should be 2^6.
43	Headline	The page header should say "Section 15" instead of "Section 16".
47	Section 2	In the second line, the symbol i in the parenthetical comment should be in italics.
51	Problem 20	The superscript in $\sin 110°$ should be a degree symbol, not the numeral 0.
51	Figure 5.1	In the first label (1, 1) for the point, there is a missing opening parenthesis.
55	Problem 56	Insert parentheses to make the problem read "(angle of z) $= \frac{\pi}{2}$".
57	Example 1	In the final line of the example, delete the spurious period at the beginning of the line.
59	Problem 1	Insert a + sign preceding the ellipsis dots.

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76	Problems	In the instructions for the problems, for "compare" read "compare with".
79	Problem 12	Insert the missing left parenthesis before each summation sign.
86	Example 2	In the last matrix, element $(3,4)$ should be 10 instead of -20. In the next line, similarly replace -20 by 10.
89	Line 5	Replace the reference to (6.24) by (6.13).
121	(6.17)	In the second line, the second expression in parentheses should be $k - \frac{k^3}{3!} + \frac{k^5}{5!} + \cdots$ with ellipsis dots.
124	Line -6	For "point to pint" read "point to point".
127	Line 6	For "facts from Section 3" read "facts from Sections 3 and 6".
136	Problem 21	In line 2, insert a missing "of" to read "in the form of a determinant."
139	(9.10)	In the displayed equation and the preceding line, notation of the form A^{T}_{jk} should be understood as shorthand for $(\mathrm{A}^{\mathrm{T}})_{jk}$.
140	Line 5	In the first line of the paragraph titled "Trace of a Matrix", for "or a square matrix" read "of a square matrix".
153	(11.21)	As mentioned on page 50, the notation λ^* is an alternative notation for $\bar{\lambda}$ (the complex conjugate of λ).
167	(12.25)	For $\lambda = 1$: $\mathbf{R} = (X, Y) = (\sqrt{2}, \sqrt{3}\,)$; for $\lambda = 6$: $\mathbf{R} = (3\sqrt{2}, -2\sqrt{3}\,)$.
168	(12.31)	On both sides of the equation, the variable y should be z.
208	Example 6	Two lines after (7.8), at the end of the sentence, insert the parenthesis: (see page 189).
212	Last line	The number 1 should be the letter l. Also replace the final period by a comma and add: and $V = w^2 l = l^3/2$.
226	(10.3a)	The equations should be $4z + 2y = 0$ and $4y + 2z = 0$.
235	Line -6	In the second integral, dt is missing.
239	Last line	Replace $(\lambda/2)$ in the exponent by λ.
261	Line -8	The expression $r \sin d\theta\, d\phi$ should be $r \sin\theta\, d\phi$.
269	Problem 24	In the fourth line, italicize the first instance of dM to match the second instance.
294	(6.8)	Replace $r \sin\phi$ by $r \sin\theta$.
306	Example 6	For "two of the equations corresponding to (8.17) do not hold" read "one of the equations corresponding to (8.17) does not hold".
311	Line 2	For "w" read "we".
311	Line 5	Reverse the opening quotation marks of "simply connected".
312	(9.12)	At the end of the line, $\mathbf{j}x$ should be $\mathbf{j}\,dx$.
313	Problem 1	The reference to Figure 9.2 should be to Figure 9.1.
329	Line -6	For "$|\mathbf{H}|$ same at all points" read "$|\mathbf{H}|$ is the same at all points".
330	Line -17	For *earths'* read *earth's*.

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336	Problem 17(g)	The integrand of the first integral on the right-hand side should be $(\mathbf{V} \times \boldsymbol{\nabla}\phi) \cdot \mathbf{n}\, d\sigma$, not $(\boldsymbol{\nabla} \times \boldsymbol{\nabla}\phi) \cdot \mathbf{n}\, d\sigma$.
336	Problem 3	In the first displayed equation, the second term on the right-hand side would be clearer with parentheses: $(\mathbf{v} \cdot \boldsymbol{\nabla})\mathbf{A}$ instead of $\mathbf{v} \cdot \boldsymbol{\nabla}\mathbf{A}$.
337	Problem 16(b)	The W at the end of the sentence is a scalar and so should not be boldface.
354	Example 2	In the last line, $\sin(x + 3\pi/2)$ should be $\sin(3x + 3\pi/2)$.
356	First display	In the first displayed equation, the expression $2 \ln x \Big\|_0^1$ should be $2 \ln x \Big\|_0^\pi$ (but the conclusion that the integral diverges to infinity is unchanged).
367	Line 4	After "cosine series" add the bracket [(9.5) and the comments following it].
371	Headline	In the page header, read "Section 9" instead of "Section 10".
380	(12.3)	The exponent should be $i\alpha_n x$ with an i.
381	(12.13)	Both integrals should be with respect to $d\alpha$.
381	(12.14)	In the second equation, $g_s(x)$ should be $g_s(\alpha)$.
382	(12.15)	In the integrand of the first equation, $g_c(x)$ should be $g_c(\alpha)$.
382	(12.17)	In the first integral, dx should be $d\alpha$. In the second line, there is a missing right-hand parenthesis in the numerator of the first integral.
383	Above (12.20)	The cross reference "from (12.1)" should be "from (12.2)".
385	Problem 22	The expression for $j_1(\alpha)$ should be $(-\alpha \cos\alpha + \sin\alpha)/\alpha^2$.
387	Problem 4(a)	In the differential equation, the lowercase c should be a capital C.
414	Problem 11	A letter y is missing. The equation should be $4y'' + 12y' + 9y = 0$.
431	Line 8	For $p\,dy/dx$ read $p = dy/dx$.
442	Line 13	The period at the beginning of the line belongs at the end of the preceding equation.
446	Example 2	In the first line of the three-line display, the second integral has unbalanced parentheses. It should be $\int_0^t (e^{-\tau} - e^{-2\tau}) e^{-(t-\tau)}\, d\tau$.
457	Example 5	The third equation for ρ should have $r^2 \sin\theta$ instead of $r \sin\theta$. The notation in lines 1, 4, and 7 of the example can be clarified by putting a subscript on the variables: namely, $(x_0, y_0, z_0) = (-1, \sqrt{3}, -2)$ and $(r_0, \theta_0, z_0) = (2, 2\pi/3, -2)$ and $(r_0, \theta_0, \phi_0) = (2\sqrt{2}, 3\pi/4, 2\pi/3)$.
458	Line 15	Two lines after the third displayed equation on the page, delete the closing parenthesis preceding the period. In other words, replace the expression $-\mathbf{e}_r/r^2)$ by $-\mathbf{e}_r/r^2$ without the trailing parenthesis.
488	Line 1	Insert a sentence-ending period after "equations".
493	(7.1)	The first equation should be parallel to the second one: $Y(x, \epsilon) = y(x) + \epsilon\eta(x)$.

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499	Line 5	For "nd" read "and".
499	(2.7)	Delete the z's in column 3 of the matrix.
506	Example 1	In the second paragraph, the cross reference "(3.5) to (3.8)" should be "(3.6) to (3.9)".
510	Example 1	In line 9, the expression $-\delta_{jn}\delta_{kn}$ should be $-\delta_{jn}\delta_{km}$. (Change the final subscript from n to m.)
514	Example 1	Starting in the middle of line 7, revise as follows: "the z components of $\mathbf{U}$ and $\mathbf{V}$ change sign and the x and y components do not; these are then requirements for all vectors. But the z component of $\mathbf{U}\times\mathbf{V}$ does not change sign while the x and y components do (Problems 3 and 4)." Continue as in the text.
515	**Polar and** $\cdots$	Starting at the end of the third line, revise as follows: "If a vector under rotations has the property that under reflections the signs of its components are opposite to those of a displacement vector, then it is called an *axial* vector." Continue as in the text.
520	Problem 2	The unit vector $\mathbf{e}_{22}$ should be $\mathbf{e}_2$.
526	(9.7)	On the right-hand side, after the equals sign, the unit vector $\mathbf{e}_1$ should be in boldface type.
535	Problem 18	The problem should read: Using (10.19), show that $\mathbf{a}^i \cdot \mathbf{a}_j = \delta^i_j$.
542	Problem 3	There is a missing left parenthesis in the binomial coefficient.
543	Problem 3	Both binomial coefficients are missing a left parenthesis.
549	Line -7	In the unnumbered three-line display between (10.3) and (10.4), the integral on the right-hand side of the first line is missing the factor $1/t^3$.
567	Problem 1	$P_l(l)$ should be $P_l(1)$, that is, the argument should be "one" instead of "ell".
568	Problems 4,5	There is a missing left parenthesis in front of the differential operator in each case.
568	(4.1)	In the denominator, 2^1 should be 2^l, that is, the exponent should be the letter "ell" instead of the number "one".
569	Problem 2	In the second line, the exponent on $(x-1)$ should be the letter "ell" instead of the number "one".
582	Problem 16	The last equation should read as follows. $$I = \int_{-1}^{1} f^2(x)\,dx + (b_0 - c_0)^2 + (b_1 - c_1)^2 + (b_2 - c_2)^2 - c_0^2 - c_1^2 - c_2^2$$
583	Line above (10.6)	Replace "are are" by "and are".
585	Example 1	In the table at the bottom of the page, the entry in the $4xy'$ row and the x^{s+2} column should be $4(s+2)a_2$ with coefficient 4 instead of 2.

Page	Location	Correction
588	pp. 588–591	The discussion of solutions of Bessel's equation has an implicit assumption that $p \geq 0$, so $-p \leq 0$.
592	Line -5	In the second displayed equation from the bottom of the page, the expression $x^{2x+2p-1}$ on the right-hand side should be $x^{2n+2p-1}$.
602	Last line	In the integral on the left-hand side of the displayed equation at the bottom of the page, the notation is confusing and technically wrong. The notation $d(r/a)$ indicates that the integration variable is r/a (equivalently x), so the limits of integration should be 0 and 1, not 0 and a. In the integral on the right-hand side of the equation, the integration variable is explicitly r, so the limits of integration are correctly 0 and a.
604	Problem 4	The problem should ask for $\lim_{x\to 0} J_p(x)N_p(x)$ (the limit of the product) instead of $\lim_{x\to 0} J_p(x)/N_p(x)$ (the limit of the quotient).
615	Problems 2 & 3	There is a missing left parenthesis in the binomial coefficient.
618	Problem 26	In the last sentence, the subscript on j should be the letter "ell" instead of the number "one".
618	Problem 28	The reference to L24 should be L34. (The reference to L23 is correct.)
621	Problem 4	The letter T, not explicitly defined, denotes temperature, the same quantity denoted by the generic letter u in equation (1.3) on page 619.
621	Section 2	At the end of the first paragraph, there is a missing period at the end of the parenthetical sentence.
624	After (2.14)	In the second line following equation (2.14), the expression that arises when $y = 30$ is actually $\frac{1}{2}e^0 - \frac{1}{2}e^0$, not $e^0 - e^0$, but is equal to 0 as claimed.
634	After (4.4)	In the line of text following equation (4.4), for "are are" read "are".
635	(4.11)	The first sum should say $\sum_{n=1}^{\infty}$, not $\sum_{n_1}^{\infty}$.
638	Problem 12	In the second line, the reference to the nonexistent equation (2.25) should be (2.15).
645	(6.6)	For $coskvt/a$ read $\cos kvt/a$ with "cos" in upright font.
647	Line 9	Replace 1^1 by 1^2.
649	Line 4	Insert a space following the italicized word *harmonics*.
651	Problem 18	The delimiters are unmatched in the displayed equation: the expression $[V(r) - E)$ should be $[V(r) - E]$.
652	Problem 22	In the line following the displayed equation, the quantity α^2 should be the reciprocal of what is indicated: namely, $-\hbar^2/(2ME)$.
655	Figure 8.4	In the caption, "FIgure" should be "Figure" (lowercase i).

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669	Example 2	Make the displayed formula read simply $\lim_{\Delta z\to 0} \dfrac{\lvert z+\Delta z\rvert^2 - \lvert z\rvert^2}{\Delta z}$ by deleting the initial "$\lim_{\Delta z\to 0} =$".
671	Last paragraph	The equation in the second line has two errors. The symbol d in the first denominator should be ∂, and the expression should be set equal to zero, thus: $\nabla^2\phi = \partial^2\phi/\partial x^2 + \partial^2\phi/\partial y^2 = 0$.
677	Problem 5	The first integral needs a dz.
677	Problem 9	In the denominator of the integrand, x should be z.
677	Problem 14	Change the parenthetical comment to read as follows: "(Note that although we take $n > m$ to make z^{n-m-1} analytic at $z = 0$, the change of variable $x = -t$ completes the proof for all $n \neq m$.)"
696	Example 6	At the top of the page, $\Theta = 3\theta$ should say $\Theta \cong 3\theta$. In the fourth line (two lines after the displayed formula), the equation $\tan\theta = -\infty$ should read $\tan\Theta = -\infty$ with a capital Θ.
711	Example 1	Line 5 should read: "at any point of the plate [see equation (13.3.7)]."
730	Last line	For "apace" read "space".
733	Line -13	In the displayed formula for $P(A)$, the factor (0.095) should be instead (0.95). The final answer 0.0755 is correct.
753	Example 4	In the expression for $\mathrm{Var}(y)$, the second integral should be $$\int_0^h \left(y - \tfrac{2}{3}h\right)^2 \frac{1}{2\sqrt{h(h-y)}}\,dy.$$ The final answer, $4h^2/45$, is correct.
769	Example 2	In the displayed formula, the term $\left(\dfrac{499}{500}\right)^{998}$ should be instead $\left(\dfrac{499}{500}\right)^{1498}$ with exponent 1498. The final answer, 0.2241, is correct. Two lines after the display, delete the extraneous period after the parenthetical remark. In the following line, the equation $\mu^x e^{-x}/x! = 3^2 e^{-2}/2!$ should read $\mu^x e^{-\mu}/x! = 3^2 e^{-3}/2!$; the final answer, 0.2240, is correct.
775	Problem 2	For $\overline{x} = \sum_{i=1}^n x_i$ read $\overline{x} = (1/n)\sum_{i=1}^n x_i$ with a factor $1/n$.
775	Problem 5	The reference to the nonexistent formula (10.14) should be to (10.13).
781	6.5	For "b D" read "(b) D"; the answer is intended to be given for part (b) of the problem.

Page	Location	Correction
784	Section 14	The given answers are the solutions that a computer most likely would produce. In some cases, there are additional possible answers. For 14.2, 14.3, 14.5, and 14.6, one can add $2\pi in$ to the given answer. For 14.10, the general solution is $e^{-\pi^2(\frac{1}{4}+n)}$. For 14.11 and 14.14, one can multiply the given solution by $e^{-2\pi n}$. For 14.15, the general solution is $e^{-(\pi \sinh 1)(1+2n)}$. For 14.23, there are two sets of solutions: $e^{\frac{1}{2}\pi - 2\pi n}$ and $(0.4361 + 0.4533i)e^{-2\pi n}$. The given solutions to 14.8, 14.18, and 14.20 are complete.
785	17.6	The answer can be multiplied by $e^{-2\pi^2 n}$.
785	17.7	The answer can be multiplied by $e^{-2\pi n}$.
787	Problem 8.23	The $\lambda = 8$ solution should be $y = -2x$.
787	Problem 10.3	$\cos(\mathbf{B}, \mathbf{D}) = 17/\sqrt{345}$.
792	Problem 10.5	The answer should be $4\pi \cdot 5^5$.
799	Problem 11.23	In both (a) and (c), the denominator of the third answer (spherical coordinates) should be $r^2 \sin\theta$ instead of $r \sin\theta$.
800	Problem 5.6	In the answer to Problem 5.6 from Chapter 9, the term $-g \sin\theta$ should be $+g \sin\theta$.
800	Problem 8.4	The answer should be $\dfrac{dr}{d\theta} = \dfrac{r\sqrt{r^4 - K^2}}{K}$.
800	Problem 4.6	The answer to Problem 4.6 from Chapter 10 should be that $$\mathrm{I} = \begin{pmatrix} 9 & -3 & 0 \\ -3 & 9 & 0 \\ 0 & 0 & 6 \end{pmatrix};$$ the principal moments are $(12, 6, 6)$; the principal axes are along the vector $(1, -1, 0)$ and any two orthogonal vectors in the plane $x = y$, say $(1, 1, 0)$ and $(0, 0, 1)$.
805	Problem 6.8	The Bessel function $J_n(k_{mn}r)$ should be $J_n(k_{mn}r/a)$. In the expression for E_{mn}, the letter m is overloaded: in the numerator, the subscript m is a positive integer, but in the denominator, the symbol m denotes the mass of a particle.
809	Problem 9.5	The answer assumes a Poisson distribution. It is arguable whether that probability model is appropriate in this problem.