1 Errata for “Principles of Applied Mathematics; Transformation and Approximation”, second edition

1. pg. 7; The law of cosines (line 15) should read

\[ ||x + y||^2 = ||x||^2 + 2||x|| \cdot ||y|| \cos \theta + ||y||^2. \]

2. pg 12; line -3 of footnote. “vetor” should be “vector”.

3. pg. 25 line 14; the null space is spanned by (2, -1)^T.

4. pg 35; Caption to figure 1.7; “rotations” should be “reflections”.

5. pg. 49; Problem 1.3.c; n must be greater than 1.

6. pg. 65, line 23; \( : : : = (||x|| + ||y||)^2. \)

7. pg. 67, last line; of the components

8. pg 72 line -6; The coefficient for the scale factor for the Legendre polynomial should be \( 2^n \) rather than \( 2_n \).

   line -3 \( \omega(x) \) should be \( w(x) \).

9. pg 73

   (a) lines 1, 4, 6, 8, 13; \( \omega(x) \) should be \( w(x) \).

   (b) line 8, \( w(x) = (1 - x)^\alpha (1 + x)^\beta \)

   (c) line 10, \( p_n^\alpha(x) = \frac{(-1)^n}{2^n n!} (1 - x)^{-\alpha} \ldots \).

   (d) line 15, The normalization constant is not the same as in other places, such as

   Hochstadt, The Functions of Mathematical Physics, pg. 41.

10. pg. 80, line 12; “basis functions” rather than “basis function”.

11. pg. 93, line 15, Ingrid

12. pg. 94, Exercise 8. (a): Use property 5 \ldots, (b) Use property 6 \ldots
13. pg. 96, Exercise 8 e), \( T_n(x) = \frac{(-1)^n x^n}{(2n)!} (1 - x^2)^{1/2} \ldots \)

14. pg. 116, line -9; \( K_n u \) rather than \( Ku \)

15. pg. 129, line 2; \( dy \) rather than \( dt \)

16. pg. 141, Example 1 should read \( \langle H', \phi \rangle = -\int_0^\infty \phi'(x)dx = \ldots \)

17. pg. 142, Example. As \( n \to \infty, \ldots \)

18. pg. 171, Problem 1a. second line of definition should be for \( |x| \geq 1 \).

19. pg. 175 Problem 4.3.9; - \( \beta \) should be replaced by \( = -\beta \)

20. pg. 180 line -2 Replace \( F + \lambda G \) by \( F - \lambda G \) (twice)

21. pg. 212, Caption to Figure 6.2, \( e^{i(\theta_1, \theta_2)/2} \) replaced by \( e^{i(\theta_1 \pm \theta_2)/2}. \)

22. pg. 215, \( \frac{\partial v}{\partial z} \) should be \( \frac{\partial v}{\partial x}. \)

23. pg. 216, line 2, \( \cdots = u_\Delta(x_0, y_0) + \cdots \)

24. pg. 216 line -1 should read \( \frac{e^{\Delta z} - e^z}{\Delta z} = \cdots \)

25. pg. 223 line -3 the denominator is missing a factor of \( r \), and should be \( 1 - 2r \cos(\phi - \theta) + r^2. \)

26. pg. 276, Problem 6.2.9; The contour should be \( |z| = 1. \)

27. pg. 276, Problem 6.3.5; The ranges for \( z \) should be strict inequalities, that is, \( \text{Im } z < 0 \) and \( \text{Im } z > 0. \)

28. pg. 308 line 4, singularities of \( F(s) \) ...

29. pg 309, line 6, becomes \( Lu = -d^2u/dt^2 - \lambda u \)

30. pg. 311 line 13 \( \lambda = 2 - \xi - 1/\xi. \)

31. pg. 314, line 2, “to be real” should be ”to be nonzero and real”.

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32. pg. 316, last line; $R_R(k) = -R_L(-k)$ is not correct. The correct statement is $R_R(k)/T_R(k) = -R_L(-k)/T_L(-k)$ for real, nonzero $k$.

33. pg. 317, line 3: $e^{ik_0}$ should be replaced by $e^{ik_0 x}$.

34. pg. 330 Exercise 11. Reference should be to Theorem 7.3.

35. pg. 361, line 6 ...if and only if $J_n(\sqrt{\lambda}R) =$

36. pg. 382 line -4 should read “$\nabla^2 \phi_j = v_j$ in $\Omega$ and $\mathbf{n} \cdot \nabla \phi_j = 0$ on $\partial \Omega$, for $j = 1, 2$."

37. pg. 396 line -1 insert “to” before solve.

38. pg. 408, last line should end with “?”.

39. pg. 409, Problem 8.4.1, the equation should read $u_{nt} = \frac{1}{n^2}(u_{n+1} - 2u_n + u_{n-1})$.

40. pg. 411, line 2: scattering transform should be inverse scattering transform.

41. pg. 412, line 5; For reasons that are somewhat subtle, it is not sufficient to assume that $q(x)$ is absolutely integrable. Instead, one must make a stronger assumption, such as $\int_{-\infty}^{\infty}(1 + |x|)|q(x)|dx < \infty$.

42. pg. 412, line -7, Im $k \geq 0$ should be Im $k > 0$.

43. pg. 426 line -12 $\frac{dq}{dt}$ should be replaced by $\frac{d^2q_n}{dx^2}$.

44. pg. 426 line -3 $\frac{dv_n}{dt}$ should be replaced by $\frac{d^2v_n}{dx^2}$.

45. pg. 542 line 17 insert “(” (open parenthesis) before cardiac.

46. pg. 567, 1.1.2 should be 1.1.3.

47. pg. 568; The answer to 1.2.1 is not computed correctly. The matrices $C$ and $D$ are correct, but the representation of $A$ should be

$$
\begin{pmatrix}
\frac{53}{6} & -\frac{19}{3} & -4 \\
\frac{13}{12} & -\frac{5}{6} & -1 \\
\frac{49}{4} & -\frac{17}{2} & -5
\end{pmatrix}
$$

(1)
48. pg. 574, 3.4.2; Answer (a) is correct answer for (b). Answer (b) is correct answer some other unrelated problem.

49. pg. 580, Problem 6.1.3;

(a) \( z = \frac{\pi}{2} + 2n\pi - i \ln(2 \pm \sqrt{3}) \).

(b) \( z = (2n + 1)\pi - i \ln(\sqrt{2} + 1), z = 2n\pi - i \ln(\sqrt{2} - 1) \).

50. pg. 575, Problem 3.5.2; \( u(x) = f(x) + \frac{\lambda}{1-\lambda} + \int_0^1 f(t)dt = x + \frac{\lambda}{2(1-\lambda)} \) when \( f(x) = x \).

51. pg. 580, Problem 6.2.3; \( \int_C z^{-1/3}dz = -3(2)^{1/3}e^{i\pi/6} \).

52. pg. 581, Problem 6.3.6; (b) \( F_x - F_y = -8\rho\pi A \). (c) \( F - x - iF_y = \rho\pi(4\gamma A - 8A^2i) \).

53. pg. 586, Problem 8.1.13; \( u(r, \theta) = -\frac{2}{\pi} \int_0^\infty \ldots \)

54. pg. 586, Problem 8.1.14; \( u(r, \theta) = \sum_{n=-\infty}^\infty a_n \ldots \)

55. pg. 593, problem 12.1.8; \( \phi_r = \frac{1}{6}A^2 \) instead of \( \phi_r = \frac{12}{6} \).

Feel free to let me know about any other errors you may find. I’ll add them to this list.