

# Linear Algebra and Probability For Computer Science Applications Errata

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Thanks to Anya Trivedi for finding 6, 14, 20, 22, and 33, to Aashka Trivedi for finding 7 and 24, to “Ralphsato” for finding 21, to Xin He for finding 23, to Antonis Nasioulas for finding 17, and to the eagle-eyed Saipriya Balasubramanian for finding 1-5, 9-11, 15, 16, 18, 19, 25, 26, 32, 37, 38, and 43.

1. p. 5. Before the second for loop add  

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>> a = 1;  
>> b = 1;
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2. p. 60 In the system of equations, in the first equation “ $t_1(3)$ ” should be “ $t_1(-3)$ ”. In the second equation “ $t_1(1)$ ” should be “ $t_1(-1)$ ”.
3. p. 82 Definition 4.2. The final capital S should be script  $\mathcal{S}$ .
4. p. 83, second bullet point. The two occurrences of  $\vec{v}$  should both be  $\vec{u}$ .
5. p. 89, line before Theorem 4.23:  $\vec{c}$  should be  $\vec{v}$ .
6. p. 118 Algorithm 5.1 “**for** (q **downto** p+1)” should be i “**for** (j=q **downto** p+1)”.
7. p. 128 line -4. “L is the matrix corresponding to the product of the operations used in reducing M to U.” This should be “L is the matrix corresponding to the product of the inverses of the operations used in reducing M to U.”
8. p. 133 In the inset formula on the second line,  $+t^3$  should be  $-t^3$
9. p. 141 line -12 (including the formulas): “then **s** is only the line from **p** to **q** only if ...” should be “then **s** is only the line from **p** to **q** if and only if ...”
10. p. 150 line -4. The inequalities should be  $-x + y - 3z > -2$  and  $-x + y - 3z < -2$  (that is, the right hand side of both inequalities is  $-2$  rather than  $2$ ).
11. p. 158 In the last inset formula, third term, the last multiplicand should be  $\vec{v}$  rather than  $\vec{u}$ . That is, this term should be  $\vec{u}^T R^T R \vec{v}$ .
12. p. 162 2nd bullet point, the inset matrix should be

$$\begin{bmatrix} 0.5 & -0.866 \\ 0.866 & -0.5 \end{bmatrix}$$

The next line should read: Thus  $\Gamma_2(\Gamma_1(\mathbf{c})) = \langle 0, 0 \rangle$ ;  $\Gamma_2(\Gamma_1(\mathbf{c})) = \langle -1.0, 1.732 \rangle$ ;

3rd bullet point second line should read  $\Gamma_3(\Gamma_2(\Gamma_1(\mathbf{d}))) = \langle 0, 2.732 \rangle$ .

13. p. 164, last two formulas at the bottom of the page should read

$$\Gamma_1 = \begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{bmatrix} \quad \Gamma_2 = \begin{bmatrix} -0.5 & -0.866 & 0 \\ 0.866 & -0.5 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad \Gamma_3 = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

so

$$\Gamma = \Gamma_3 \cdot \Gamma_2 \cdot \Gamma_1 = \begin{bmatrix} -0.5 & -0.866 & 2.3660 \\ 0.866 & -0.5 & 0.6340 \\ 0 & 0 & 1 \end{bmatrix} \quad \text{and} \quad \Gamma \cdot \mathbf{d} = \begin{bmatrix} 0 \\ 2.7321 \\ 1 \end{bmatrix}$$

14. p. 220 5th line from the bottom  $\vec{b}_1$  should be  $\vec{b}_n$ .

15. p. 225, 2nd line from the bottom: “at least two heads” should be “exactly two heads.”

16. p. 226, 7 lines from bottom (not including the inset formula): “total number of combinations” should be “total number of permutations”.

17. p. 227 5 lines from the end of section 8.3.4, “the expansion of  $(x + y)^k$ ” should be “the expansion of  $(x + y)^n$ ”.

18. p. 228, inset formula, second line, second factor in the product, first term in the denominator should be  $k_2!$ . That is, this line should read

$$= \frac{n!}{k_1! \cdot (n - k_1)!} \cdot \frac{(n - k_1)!}{k_2! \cdot (n - k_1 - k_2)!} \cdot \frac{(n - k_1 - k_2)!}{k_3! \cdot (n - k_1 - k_2 - k_3)!} \cdots$$

19. p. 230 line 1: “Section 8.3” should be “Section 8.2”.

20. p. 231 Definition 8.8 first bullet: “ $E_i \cap E_j$  are mutually exclusive” should be “ $E_i$  and  $E_j$  are mutually exclusive.”

21. p. 232, final formula in section 8.5: Union should be intersection throughout. Also “ $E_2$ ” and “ $E_3$ ” in the middle of the formula should be “ $E_2$ ”. and “ $E_3$ ” respectively. That is, the formula should read:

$$P(E_1 \cap E_2 \cap \dots \cap E_k) = P(E_1|E_2 \cap \dots \cap E_k) \cdot P(E_2|E_3 \cap \dots \cap E_k) \cdot \dots \cdot P(E_{k-1}|E_k) \cdot P(E_k).$$

22. p. 235 end of bottom line: “ $\neg(E_1 \wedge E_j)$ ” should be “ $\neg(E_i \wedge E_j)$ ”.

23. p. 241 equation 8.10:  $\text{OR}(X|F)$  should be  $\text{OR}(X|F)$ .

24. pp. 254-256. Assignment 8.3 contains an error; fixing it elegantly requires a significant rewriting. An improved version can be found at <http://www.cs.nyu.edu/faculty/davise/MathTechniques/Prog8-3.pdf>

25. p. 259 Section 9.1 fourth sentence: “If we sum up each row, we get a row vector of length  $n$ ; this is the overall probability distribution of  $Y$ ” should read “If we sum up each column, we get a row vector of length  $n$ ; this is the overall probability distribution of  $Y$ ”.

26. p. 263, last para before section 9.3.1, 2nd and 3rd line: “. . . a 0.25 probability of a net utility of  $4 + (-20) = 16$ ; the expected net utility is therefore  $0.75 \cdot -1 + 0.25 \cdot -16 = -4.75$ .” should be “. . . a 0.25 probability of a net utility of  $(-5) + (-20) = -25$ ; the expected net utility is therefore  $0.75 \cdot -1 + 0.25 \cdot -25 = -7$ .”

27. p. 266 third inset formula:

$$\text{Outcome}(A) = [20 \dots$$

should be

$$\text{Outcome}(A) = [30 \dots$$

28. p. 266 fourth inset formula:

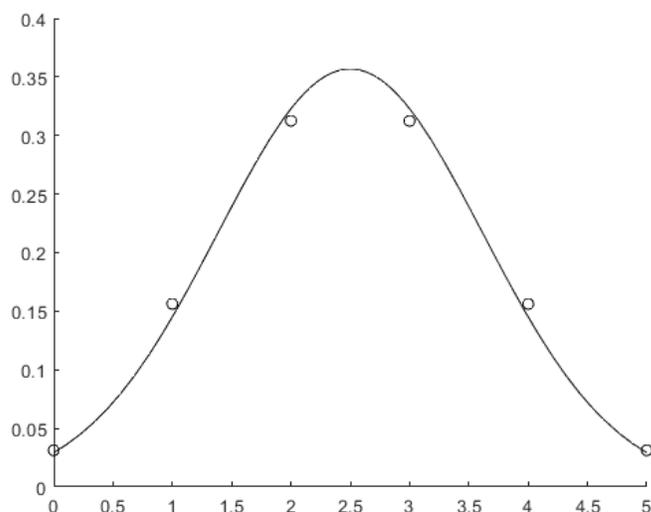
$$P(\text{Outcome}(A)=20) \dots$$

should be

$$P(\text{Outcome}(A)=30) \dots$$

29. p. 275, caption to Figure 9.4. "solid line" should be "dashed line".

30. p. 290 Figure 9.10 is incorrect. It should be thus:



In the caption for figure 9.10, " $N_{2.5,\sigma}/\sigma$ " should be " $N_{2.5,\sigma}$ ". The inset formula at the bottom of the page should read

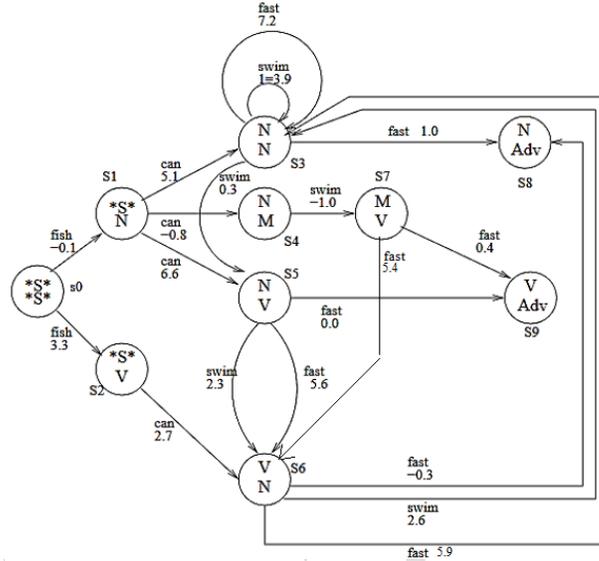
$$|B_{n,p}(k) - N_{np,\sigma}(k)| \text{ is } O\left(\frac{1}{n}\right)$$

31. p. 293, Exercise 9.3, second line. " $P(X = 1) = 0.5; P(X = 2) = 0.4;$ " should be " $P(X = 0) = 0.5; P(X = 1) = 0.4;$ ".

32. p. 293, Problem 9.1, second line. "doctors office" should be "doctor's office".

33. p. 200 line 12: "arc in the model from  $u$  to  $v$ " should be "arc in the model from  $v$  to  $u$ ".

34. p. 316. Figure 10.4. There should be an additional arc from vertex “M V” to vertex “M N” labelled “fish 5.4”. The corrected graph is this:



35. p. 333 Example 11.3 line 6: “posts” should be “positis”.
36. p. 334-335. On p. 334 I use  $\Omega$  to mean the set of all data sets. On p. 335 I use  $\Omega$  to mean a set of hypotheses. Change the two occurrences of  $\Omega$  on p. 335 (lines 5 and 8) to  $\Theta$ .
37. p. 334 item 2. “P(-T|Q)” should be “P(T|Q)”.
38. p. 336, Exercise 11.2 last sentence: “As in Exercise11.2” should be “As in Exercise 11.1”.
39. p. 339 line -14. “whether the point is in  $Q$ ” should be “whether the point is in  $R$ ”.
40. p. 339 line -9. “standard deviation  $50\sqrt{p(1-p)/N}$ ” should be “standard deviation  $100\sqrt{p(1-p)/N}$ ”.
41. p. 339 line -7. “95% confidence interval [5.22, 6.10]” should be “95% confidence interval [5.21, 6.11]”.
42. p. 339 line -3. “confidence interval [2.64, 3.44]” should be “confidence interval [2.80, 3.44]”
43. p. 342 line -6. “standard deviation of  $\sqrt{p(1-p)/N}$ ” should be “standard deviation of  $|Q|\sqrt{p(1-p)/N}$ ”.
44. p. 345, section 12.5, line 1:  $\sum_{x \in Q}$  should be  $\sum_{x \in Q} f(x)$ .
45. p. 381. Delete problem 13.1, which is simply confused.