

**Corrections and Comments for the 5th edition of: “Introductory  
Combinatorics”  
by Richard A. Brualdi  
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(Other corrections/comments gratefully received. Mail to: brualdi AT math.wisc.edu)

1. Page 16 (the mutually overlapping circles problem): The statement: “Each of the  $2(n - 1)$  arcs divides a region formed by the first  $n - 1$  circles  $\gamma_1, \dots, \gamma_{n-1}$  into two, creating  $2(n - 1)$  more regions” is not correct. It may happen that a region gets divided into more than two regions. It should say that each of the  $2(n - 1)$  arcs creates a new region, giving  $2(n - 1)$  more regions. (This problem and solution has been in various places in the book since its first edition. This is the first time that this subtle error has been brought to my attention! Thanks to Cristina Ballantine)
2. Page 62, Exercise 16: The reference should be to Theorem 2.3.1 (not Theorem 3.3.1). (Thanks to Cristina Ballantine)
3. Page 63, Exercise 23: This exercise may be a little ambiguous. The intent was to determine the number of ways the players could have their sets of 13 cards as the game begins. (Thanks to Doug Shaw)
4. Page 63, Exercises 24 and 25: There may be some ambiguity here. It would be better to say: “In how many ways can the people be seated?” (Thanks to Doug Shaw)
5. Page 142, lines -15, -14, -13: That sentence should read: More generally, given any  $A \subset S$  with  $|A| = k$ , the number of maximal chains containing  $A$  equals  $k!(n - k)! \dots$ . (Thanks to Michelle Bodnar, University of Michigan, Class of 2013.)
6. Page 156, Exercise 19: “observing” here is meant to imply that a student should “prove.” So maybe it would have been better to say: “by first proving that  $m^2 = 2\binom{m}{2} + \binom{m}{1}$ .” (Thanks to Doug Shaw)

7. Page 157, Exercise 26: The identity is incorrect. It should read:

$$\sum_{k=1}^n \binom{n}{k} \binom{n}{k-1} = \frac{1}{2} \binom{2n+2}{n+1} - \binom{2n}{n}.$$

(Thanks to an unknown Chinese student)

8. Page 159, Exercise 44: The value of the summation should be  $(-3)^n$ ;

$$\sum_{n_1+n_2+n_3=n} \binom{n}{n_1 \ n_2 \ n_3} (-1)^{n_1-n_2+n_3} = (-3)^n.$$

(Thanks to Moa Apagodu and his student Heather Smith)

9. Page 159, Exercises 44 and 45: Other variations of the identities in these exercises are:

$$\sum_{n_1+n_2+n_3=n} \binom{n}{n_1 \ n_2 \ n_3} (-1)^{n_2} = 1$$

$$\sum_{n_1+n_2+n_3+n_4=n} \binom{n}{n_1 \ n_2 \ n_3 \ n_4} (-1)^{n_2+n_4} = 0.$$

(Thanks to Donald Kreher, and independently Rod Peled.)

10. Page 170, Line 1: The reference should be to Theorem 2.5.1, and not to Theorem 3.5.1. (Thanks to Christopher White)

11. Page 214, line 6: The  $k$  in the formula for  $g_n$  should be a  $p$ :

$$g_n = \sum_{p=0}^{n-1} \binom{n-1-p}{p}.$$

Thanks to Stephanie Vance.

12. Page 223, line 10: The reference should be to Section 7.2, not 7.5. (Thanks to Sultan M. Al-Suleiman and independently Cristina Ballantine)

13. Page 224, last line: It should be  $\{m_1 \cdot a_1, m_2 \cdot a_2, \dots, m_k \cdot a_k\}$ , not  $\{m_1 \cdot e_1, m_2 \cdot e_2, \dots, m_k \cdot e_k\}$ . (Thanks to Cristina Ballantine)

14. Page 280, line 1: The reference should be to equation (5.19) not to equation (5.14). (Thanks to Craig Rasmussen.)
15. Page 286, line 16-17: The set  $\{1, 2, \dots, k\}$  should be  $\{1, 2, \dots, p\}$ ; so it is partitions of  $\{1, 2, \dots, p\}$  into  $k$  nonempty, distinguishable boxes that are being counted. (Thanks to Tyson Williams.)
16. Page 319, Exercise 37: The initial  $C_n$  should be  $R_n$ : “The large Schröder number  $R_n$  counts ... .” (Thanks to Stephanie Vance.)
17. Page 325, paragraph beginning with “The discussion in ... ”. There is the assertion: “There is a tiling of the board if and only if the domino family has an SDR.” This assertion should have begun with: Assume  $m = n$ . (Thanks to Donald Kreher)
18. Page 422, line 6: The walk  $\alpha_1$  from  $x$  to  $a$  should be from  $x$  to  $z$ :  $\alpha_1 : x - \dots - z$ . (Thanks to Doug Shaw)
19. Page 432, footnote # 44: It’s Claude Shannon (not Clause). (Thanks to Donald Kreher and his student Eric Crawley)
20. Page 451, Exercises 16 and 17: There are two part (b)’s in these exercises. The second (b) in each case should have been (c). In the case of the second (b) in Exercise 16, it says: “Determine all the nonisomorphic subgraphs of order 6.” Of course, these are the same as in the first (b). It would have been better to ask: “Determine all the nonisomorphic subgraphs of order 4.” (Thanks to Doug Shaw)
21. Page 453, Exercise 34: The intent here was that the graphs are connected, since an Eulerian graph may have vertices of degree 0. (Thanks to Doug Shaw)
22. Page 477, line 21: It should be “and hence a 5-coloring is possible.” (Thanks to Cristina Ballantine)
23. Page 478, line 2 below Figure 12.6: The reference should be to Theorem 12.3.1 (not to Lemma 12.1.1 which doesn’t exist!). (Thanks to Cristina Ballantine)
24. Page 479, line 1: It should be  $y_2$  (not  $x_2$ ). Thanks to Cristina Ballantine)

25. Page 503, Exercise 58: The answer to part (a) given on page 593 is incorrect if  $n$  is congruent to 3 mod 4. If  $n = 4k + 3$ , then the answer gives  $2k + 1$ , but it is impossible to have a regular graph of odd degree  $d = 2k + 1$  if the number  $n = 4k + 3$  of vertices is odd. In this case the answer should be  $2k + 2$ . (Thanks to Doug Shaw)