

## ERRATA

### for *Algebraic Combinatorics*, Springer, 2013

(22 November 2017)

- page 8, Exercise 5, line 3. Change  $G$  to  $H_n$ .
- page 9, Exercise 13. It should be assumed that  $G$  is a simple graph. (Otherwise one has to consider “adjacency with multiplicity”).
- page 13, line 4. Change the first  $=$  to  $\neq$ .
- page 14, first line after (2.4). Change “ $(u, v)$ -entry of the matrix  $\Phi_\Delta$ ” to “ $(u, v)$ -entry (short for  $(f_u, f_v)$ -entry) of the matrix  $[\Phi_\Delta]$ ”.
- page 16, line 5. Change  $(-1)^{u+w}$  to  $(-1)^{u \cdot w}$ .
- page 18, Exercise 2(a). Assume that  $k \leq n/2$ .
- page 22, line 11–. It actually was not previously assumed (though it should have been) that “ $G$  is connected and has at least two vertices.” Moreover, connected graphs are not defined until page 135.
- page 23, line 2–.  $\mu(w, v)$  is the same as  $\mu_{wv}$  (the number of edges between  $u$  and  $v$ ). Also on page 24, equation (3.5) and line 8–.
- page 25, line 2. Change the last  $\mathbf{B}^{m-1}$  to  $\mathbf{B}^{m+1}$ .
- page 26, line 3. The claim that  $0 \leq \sigma_i \leq 1$  is not true. We need to work with the row sums, not the column sums. Essentially, the argument works with  $\mathbf{N}_i$  replaced by the transpose  $\mathbf{N}_i^t$ .
- page 26, line 4. Change  $V\mathbf{N}_iU$  to  $V\mathbf{N}_i^tU$ .
- page 29, Exercise 8, line 2. Change  $n^2$  to  $(n-1)^2$ .
- page 29, line 3–. Change  $H(u, v)$  to  $H_k(u, v)$ .
- page 32, line 3–. Change “We call  $P_i$  the  $i$ th level” to “We call  $P_j$  the  $j$ th level”. (While this does not affect the meaning, it’s obviously better to keep the notation consistent.)
- page 71, line 11–. Change “Exercise 5” to “Exercise 6.5”.

- page 83, line 7. Add “or *cycle enumerator*” after “*cycle index polynomial*” (since the term “cycle enumerator” is used later in the text).
- page 87, line 10–. Change “is a line” to “in a line”.
- page 93, line 14–. Change  $\frac{1}{4}$  to  $\frac{1}{8}$ .
- page 94, line of table beginning 2, 1, 1. Change (12, 23) to (13, 23).
- page 95, line 4. Change  $\sum_{i=0}^{i(i-1)}$  to  $\sum_{i=0}^{12}$ .
- page 109, line 10–. Change  $n - i + 1$  to  $i - n - 1$ .
- page 110, line 6. Change “from  $\emptyset$  to  $w$ ” to “from  $\emptyset$  to  $\lambda$ ”.
- page 116, line 14–. Change  $\sum_{m_k \geq 1}$  to  $\sum_{m_k \geq 0}$ .
- page 116, line 2–. Change “most  $r$ ” to “most  $s$ ”.
- page 127, Exercise 14, line 4. Change I to  $I$ .
- page 129, line 3–. Although the meaning is clear, for consistency of notation one should change 1 to  $I$ .
- page 140, line 9–. Change  $f_j$  to  $f_i$ .
- page 142, line 7–. Change  $p \cdot \det(\mathbf{L}_0)$  to  $-p \cdot \det(\mathbf{L}_0)$ .
- page 144, lines 9 and 10. Change  $T_2$  to  $T_1$  (twice).
- page 145, line 5–. Change “rooted” to “planted”.
- page 146, figure at top of page. The figure is missing six planted forests at the top level, viz., the six planted forests with one endpoint. There are  $3!t(3) = 18$  maximal chains in all.
- page 146, line 10. Change “one” to “zero”.
- page 151, line 14–. Insert before the period at the end of the sentence: “, denoted  $\text{init}(e)$  and  $\text{fin}(e)$ , respectively”.
- page 151, line 13–. Change “Definition 8.5” to “Definition 9.5”.

- page 151, Theorem 10.1. The definition of a connected digraph needs to appear before this theorem. First one should define a *walk* in a digraph in an obvious way analogous to the undirected case. A digraph  $D$  is *strongly connected* if it is nonempty and there is a walk from any vertex  $u$  to any vertex  $v$ . A digraph  $D$  is *weakly connected* if it is connected as an undirected graph, i.e., after replacing each directed edge, say from  $u$  to  $v$ , with an undirected edge incident to  $u$  and  $v$ . Theorem 10.1 is true with either definition of connectedness.
- page 152, line 11–. Change “unique directed path” to “unique directed walk”. (Otherwise the digraph with vertices  $1, 2, 3$ , where  $v = 3$ , and edges  $1 \rightarrow 2, 2 \rightarrow 1, 2 \rightarrow 3$  is an unwanted example.)
- page 152, line 9–. Insert after “ $1 \leq i \leq r - 1$ .” the parenthetical sentence “(All three of these conditions are considered to be vacuously true if the sequence  $e_1, \dots, e_r$  is empty.)”
- page 152, line 7–. Insert before “There is ...” the sentence “From now on, an oriented subtree of  $D$  will always mean a subdigraph of  $D$  that is an oriented tree with the full vertex set  $V$ , or in other words, a *spanning* oriented subtree of  $D$ .”
- page 153, line 2. While this line is correct as it stands, it would be logically better to replace “ $\text{init}(e(u)) = u$ ” with “ $\text{init}(e_j) = u$ ”.
- Proof of Theorem 10.4. The induction is not quite correct since in the statement of the theorem it is assumed that  $D$  is connected, while  $D_1$  and/or  $D_2$  may not be connected. This problem is easily fixed since the determinant of the reduced Laplacian matrix  $\mathbf{L}_0(D)$  of a disconnected digraph  $D$  is clearly 0 [why?], and the number of oriented spanning subtrees (with any root) of a disconnected graph is also clearly 0.
- page 156, Example 10.8, line 3. Change  $a_{2^m}$  to  $a_{2^n}$ .
- page 156, lines 3– to 1–. The definition of  $D_n$  is not quite right when  $n = 1$ , where we need two edges rather than one. It would be better to say that the edges of  $D_n$  are binary sequences  $a_1 \cdots a_n$  with initial vertex  $a_1 \cdots a_{n-1}$  and final vertex  $a_2 \cdots a_n$ .
- page 157, line 10–. Change  $\mathbf{L}(D_n)$  to  $\mathbf{L}_0(D_n)$ .

- page 157, Lemma 10.9, line 2. Change “walk” to “path”.
- page 158, line 5. To be precise, this definition does not work when  $n = 1$ .
- page 163, line 3–. Insert “to” before second “do”.
- page 164, line 1. Change “Suppose that  $C$ ” to “Suppose that a circuit  $C$ ”.
- page 171, line 11–. Change “real matrix” to “real”.
- page 172, line 7. Change  $C_{T_1}^*$  to  $C_{T_1}$ .
- page 174, line 1–. Change  $C_T$  to  $B_T$ .
- page 183, diagram of squared square. There is an unlabelled  $17 \times 17$  square.
- page 184, Exercise 5, line 2. Change “there in” to “there is”.
- page 189, line 1. It should be stated before this sentence that the number of prisoners is  $2n$ .
- page 190, line 4–. Insert after “*Proof.*” the sentence “Take the vertex set of  $K_n$  to be  $[n]$ .”
- page 190, line 2–. Change  $1 \leq i \leq n$  to  $1 \leq k \leq n$ .
- page 191, line 4 above Section 2.4. Change  $X$  to  $S$ .
- page 194, line 16. Change “rows of  $\mathbf{A}$ ” to “rows of  $\mathbf{A} + I$ ”.
- page 195, line 8–. Change  $k \geq 2$  to  $k \geq 3$ .
- page 196, line 6–. insert after  $z^n$  the phrase “when  $n$  is odd”.
- page 197, line 1–. It is assumed that  $R \neq 0$  means  $R \neq \{0\}$ .
- page 199, first displayed equation. Change  $\sum$  to  $\prod$ .
- page 201, line 5. Change “an” to “a”.
- page 202, line 3. Remove the first ] .

- page 206, Exercise 25(b), line 2. Change  $p_m(x)$  to  $p_d(x)$ .
- page 207, Exercise 28(c). It should be assumed that the rational function  $F(x_1, \dots, x_m)$  has a power series expansion  $\sum_{i_1, \dots, i_m \geq 0} c_{i_1, \dots, i_m} x_1^{i_1} \cdots x_m^{i_m}$ , that is, the formal product of the denominator of  $F(x_1, \dots, x_m)$  with the series equals the numerator of  $F(x_1, \dots, x_m)$ .
- page 209, Hint 2.2. Change this hint to “Give an argument analogous to the proof of Theorem 8.9.”
- page 211, Exercise 9.11, line 1. Change “numberof” to “number of”.
- page 212, **12.26**. Insert “the equation” after “with respect to  $x$ ”.