ERRATA

for *Enumerative Combinatorics*, vol. 1, 2nd ed., 2012

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- page 5, line 9–. Insert "a" after "is".
- page 23, line 6. Insert "a" after "is".
- page 24, line 2. Change c_i to c_1.
- page 34, line 15. It should be stated that for this second way, $d+1$ cannot be inserted at the end even though $d \notin D(w)$.
- page 38, line 17. Change "such letter appears in exactly one compartment" to "compartment contains exactly one such letter".
- page 38, line 18. Change "does" to "do".
- page 40, line 15. The intent of the parenthetical comment was to write the summation as

$$\sum_{g(4)\geq g(6)} \sum_{g(6)\geq g(3)} \cdots \sum_{g(5)\geq 0} q^{g(4)+\cdots+g(5)}.$$

  We are actually first summing on $g(5) \geq 0$, then $g(1) \geq g(5)$, etc.
- page 40, line 4–. Insert $\sum_{m\geq 0}$ before $\sum_{w\in\mathfrak{S}_d}$.
- page 43, line 4. Change "relection" to "reflection".
- page 43, line 14. Change $i \geq 0$ to $i \geq 1$.
- page 45, line 1. Change w to $T(w)$.
- page 46, line 13–. Remove bracket at end of line.
- page 47, line 11. Change $n \geq 2$ to $n \geq 1$.
- page 49, lines 20–22. The two sentence beginning "Figure 1.10 ..." and "Let $f(n)$ denote ..." should be interchanged, since $f(n)$ is used in the first of these sentences but defined in the second.

- page 50 , line 4. Change "tree" to "trees".
- page 53, line 1–. Change n to $n-1$.
- page 54, line 8. Change "number" to "numbers".
- page 61, Figure 1.15. Change $w = 1212112$ to $w = 12121121$.
- page 62, equation (1.78). Change $j \in \mathcal{S}_i$ to $j \in S_i$.
- page 62, line 13–. Change $\mathcal{S}_j$ to S_i.
- page 65, line 3. Perhaps it is misleading to say that the bijection is "easy to check".
- page 65, line 7. Change proposition to Proposition.
- page 66, line 13. Change $F(0,q)$ to $F(x,0)$.
- page 68, line 17–. Change "k of the γ_i's to "k γ_i's".
- page 70, lines 3 and 5. Replace "replacing" with "placing".
- page 71, line 2–. Change "then then" to "then the".
- page 76, line 2. Change "x to $-x$" to "t to $-x$".
- page 77, line 5–. Change "$f(0), f(0)$" to "$f(0), f(1)$".
- page 78, line 5. Note that in the formula $\Delta(x)_n = n(x)_{n-1}$, Δ is acting on x, not on n as before.
- page 85, Theorem 1.10.4, line 3. Change $\mathrm{GL}(n,q)$ to $\mathrm{GL}(m,q)$.
- page 88, line 11–. Change m_k to $m_k - 1$.
- page 88, line 13–. Change v_{ij} to v_{1j}.
- page 89, line 3–. Change 1.8.6(c) to 1.8.6(a).
- page 92,line 5. Change $f \neq 0$ to $f \neq z$.
- page 92, line 7. Insert the exponent -1 at the end of this line.
- page 94, line 15. Change $\psi(F)$ to $\psi(A)$.

- Lemma 1.10.14, line 3. The case $n = 0$ is unnecessary since the formula for a_n is valid for $n = 0$.
- Proof of Lemma 1.10.14. Bruce Sagan notes that there is a simple combinatorial proof that $a_n = (q-1)^{n-1} - a_{n-1}$. The proof of the lemma follows by induction.
- page 96, line 3–. Change $\#\Gamma_{\mathrm{id}}$ to $\#(\mathrm{GL}_0(n,q) \cap \Gamma_{\mathrm{id}}$.
- page 98, line 7. Change "in the monograph" to "is the monograph".
- page 98, line 20. Change Rodriques to Rodrigues.
- page 98, line 16–. Change "papers [1.23][1.24]" to "paper [1.24]".
- page 104, Exercise 3.3(e). We should assume $n \geq 1$.
- page 109, Exercise 35(b,c,d). For the history of these results, see MathOverflow 63561.
- page 111, line 2. Change "second" to "third".
- page 111, Exercise 49, line 1. Change (1.38) to (1.37).
- page 112, Exercise 54(a), line 1. Change $A(2n+1, n+1)$ to $A(2n+1, n)$.
- page 112, Exercise 55. One should compute $\mathrm{maj}(w^r)$ in terms of both $\mathrm{maj}(w)$ and $\mathrm{des}(w)$, not just $\mathrm{maj}(w)$.
- page 112, Exercise 55, line 2. Delete ", respectively", since $\mathrm{maj}(w^r)$ is expressed in terms of both $\mathrm{des}(w)$ and $\mathrm{maj}(w)$.
- page 113, Exercise 1.58(a), line 2. Change "and" to "can".
- page 114, Exercise 61(b). It would be better to use a different letter than u, since u has different meaning in part (a).
- page 114, Exercise 61(c). Although there is technically no error, the terminology in parts (a) and (c) is inconsistent. In (a) the peaks and valleys are the terms w_i, while in (c) the double falls are the indices i.
- page 114, Exercise 62(b), line 2. Change k to i (twice) (in order to be consistent with the notation of the solution on page 160).

- page 115, Exercise 70(b), line 3. Change $(1,0)$ to $(0,1)$, and change "i.e," to "i.e.,".
- page 120, Exercise 94, second bullet. Change "Then" to "The".
- page 121, Exercise 96(c), line 3. Change 4.4.1.1 to 4.1.1.
- page 121, Exercise 98. Strictly speaking, when we put $q = \zeta$ in the definition of $\begin{bmatrix} n \\ k \end{bmatrix}$ on page 55, we get $0/0$. To be precise we should write $\lim_{q \to \zeta} \begin{bmatrix} n \\ k \end{bmatrix}$.
- page 123, Exercise 116(b), line 2. Change distribuiton to distribution.
- page 125, line 3. Change $\Delta^j g_k(-n)$ to $\Delta^j g_k(-n)|_{n=0}$.
- page 126, line 2. Change $1 \leq i < j \leq n$ to "$1 \leq i \leq j \leq n$, excluding $(i,j) = (1,n)$,".
- page 126, Exercise 128(d), line 7. Change $\frac{2}{1+x}$ to $\frac{2x}{1+x}$.
- page 126, Exercise 129(a), line 3. Add $\sum_{k \geq 0}$ after $\sum_{n \geq 1}$.
- page 127, Exercise 135, line 2. Change "n even" to "n even, $n \neq 0$".
- page 132, Exercise 161(a), lines 2 and 3. Change $\Phi_{k,0}$ to $\Psi_{k,0}$ (in order to be consistent with the previous exercise and to avoid possible confusion with the cyclotomic polynomial $\Phi_k(x)$). It would also be better notationally to write $F_k(x)$ instead of $\Psi_{k,0}(x)$ on line 3.
- page 136, line 1–. Change q^{n-1} to q^{k-1}.
- page 137, Exercise 184(a), line 5. Change "polynomials $f(x) = \beta$ for $0 \neq \beta \in \mathbb{F}_q$ are" to "polynomial $f(x) = 1$ is".
- page 137, Exercise 184(b), line 1. To be consistent with (a), change $f(n,q)$ to $f_q(n)$.
- page 138, Exercise 186(a), line 3. Insert "of Exercise 1.185" after "(b)".
- page 138, equation (1.148). Change q^{m+n-1} to $q^{m+n-1}(q-1)$.
- page 139, Exercise 193, line 2. Change γ_n to $\gamma(n)$.

- page 140, Exercise 199, line 4. The condition (only relevant in characteristic 2) should be that $A = -A^t$ and A has 0's on the main diagonal. Some people will take this to be the definition of "skew-symmetric," while others will call these matrices "alternating."

- page 140, Exercise 198(b), last displayed equation. Change (q^{2m-1}) to $(q^{2m-1} - 1)$ (twice).

- page 148, Exercise 56, line 3. Change $=$ to $\subseteq$.

- page 150, Exercise 22(b), line 6. Change x^{2i+1} to x^{2i-1}.

- page 151, Exercise 25, line 3–. Change "r of these parts" to "s of these parts".

- page 151, Exercise 25, line 3–. Change $\binom{r+s}{r}$ to $\binom{r+s}{s}$. Of course these two binomial coefficients are equal, but it is more logical to use $\binom{r+s}{s}$.

- page 152, Exercise 35(f), lines 7–8. In the sentence "Replace ...", change the two 1's to 2's, and change the 2 to 1.

- page 152, Exercise 35(f), line 9. Change each 1 to 2 and each 2 to 1.

- page 153, Exercise 36, line 2. Change $f_k(1)$ to $f_1(k)$ (twice).

- page 155, Exercise 43, line 8–. Change j to $n - j$.

- page 156, line 2. Change *Combinatorica* to *Combinatoria*.

- page 156, Exercise 49, line 3. Change the comma at the end of the line to a period.

- page 156, Exercise 49, line 4. Delete this line.

- page 156, Exercise 49, line 5. Delete **b.** at the beginning of the line.

- page 156, line 9–. Change $f(x) = 0$ to $(1 - x)^{-d-1} A_d(x) = 0$.

- page 159, line 8–. Change $F - bx$ to $F - x$.

- page 160, line 12. Change $g(n + 1)+$ to $g(n + 1) =$.

- page 160, Exercise 62. Change **a., b., c.** to **b., c., d.**.

- page 160, lines 5–6. Perhaps the sentence "This bijection ... and so on." would be clearer if it were replaced with "*Hint.* This bijection has the property that $\max\{a_1, \ldots, a_n\} = \mathrm{des}(\rho(w)^{-1}) + 1$."

- page 163, Exercise 80. For the convoluted history of this result, see R. Gilbert, A Fine rediscovery, *Amer. Math. Monthly* **122** (2015), 322–331. In particular, the result is actually first due to N. J. Fine in 1959.

- page 164, Exercise 83, lines 7–8. Change (a, a) to (u, u) and $(a + 1, a)$ to $(u + 1, u)$ (since a has already been used as an indeterminate).

- page 164, Exercise 83, line 4–. Change the second denominator factor $(1 - a^j b^j c^{j-1} d^{j-1})$ to $(1 - a^j b^{j-1} c^j d^{j-1})$.

- page 165, Exercise 89, line 7. Change n to k (twice).

- page 166, line 1. While this sentence is correct, there is direct agreement with equation (1.88) if one substitutes $-q^{-1/2}$ rather than $-q^{1/2}$ for x.

- page 166, Exercise 91(d), line 4. Replace this line with

$$1 + \sum_{n \geq 1} (-1)^n (x^n - x^{-n-1}) q^{\binom{n}{2}}.$$

- page 166, Exercise 92. This identity is actually due to I. Gessel and D. Stanton, *Trans. Amer. Math. Soc.* **277** (1983), 173–201 (equations (7.13) and (7.15)).

- page 168, Exercise 104, line 1. Notation is confusing! Change $f(x)$ to $F(x)$.

- page 168, Exercise 104, line 1. Change $i^2 = 1$ to $i^2 = -1$ and $f(x)$ to $F(x)$.

- page 168, Exercise 104, line 2. Change the last four f's to F.

- page 168, Exercise 104, line 4. Change the four lines with a left brace to

$$= \begin{cases} \frac{1}{4}\left(10^n + (-1)^k 2^{2k+1}\right), & n = 4k \\ \frac{1}{4}\left(10^n + (-1)^k 2^{2k+1}\right), & n = 4k+1 \\ \frac{1}{4}10^n, & n = 4k+2 \\ \frac{1}{4}\left(10^n - (-1)^k 2^{2k+2}\right), & n = 4k+3. \end{cases}$$

- page 169, Exercise 108, line 3–. Change "in papers" to "in the papers".
- page 169, Exercise 109(a), line 4. Change "is bijection" to "is a bijection".
- page 169, Exercise 111. The first sentence may be unclear. We are counting the number of ways to choose a k-element subset S of $[n]$ and then partition S into j intervals.
- page 170, Exercise 117. A simpler proof was suggested by Bruce Sagan. Let the cycle containing 1 be $(1, a_2, \ldots, a_k)$. There are $(n-1)(n-2)\cdots(n-k+1)$ ways to choose $a_2, \ldots, a_k$ and then $(n-k)!$ ways to permute the elements not in this cycle, etc. Perhaps the difficulty rating of this exercise should be [2].
- page 170, Exercise 118(b). As pointed out by Bruce Sagan, there is a simple solution analogous to the solution above for Exercise 117.
- page 171, line 4. The index entries for these four names is missing.
- page 171, line 6. Insert a space between "Let" and v.
- page 172, line 6. Change $(-1)^j b_{k-j}$ to $(-1)^j \binom{-n}{j} b_{k-j}$.
- page 173, Exercise 129. Change the parts **a** and **b** to **b** and **c**.
- page 173, Exercise 134, line 2. Change the period after Petersen to a comma.
- page 176, Exercise 146. Bruce Sagan points out that this exercise can also be done directly from (1.59) and a simple Inclusion-Exclusion argument.
- page 176, line 7–. Change "left subtree" to "right subtree".
- page 179, line 4. Change $F_1\left(\frac{1}{1+x}\right)$ to $F_1\left(\frac{x}{1+x}\right)$.
- page 179, line 5. Change $G\left(\frac{1}{1+x}\right)$ to $G\left(\frac{x}{1+x}\right)$.
- page 180, Exercise 161(b). Change every appearance of H in this solution to F.

- page 181 line 5. The two square roots should be preceded by $\pm$ since their signs have yet to be determined.
- page 181, Exercise 164, line 1. Change $x = 0$ to $y = 0$.
- page 181, line 4–. Change x to y.
- page 182 Insert after "$x + p_2x^2 + \cdots$." the following sentence:

  Then we need to show that $p_{2n} \in I := \langle p_2, \ldots, p_{2n-1} \rangle$, the ideal of the polynomial ring $K[a_2, a_3, \ldots]$ generated by $p_1, \ldots, p_{2n-1}$.

  The sentence after this one should begin a new paragraph.
- page 183, line 5. Change $A(-A(-x)$ to $A(-A(-x))$.
- page 183, Exercise 168. The parts **b.**, **c.**, **d.**, **e.**, **f.** should be **d.**, **f.**, **g.**, **i.**, **j.**, respectively.
- page 183, line 11–. Change $n \geq$ to $n \geq 0$.
- page 184, line 1. Change xy^2 to x^2y.
- page 186, lines 4–5. Change D to E (twice), since D has already been used.
- page 186, Exercise 164. Change the parts **a** and **b** to **b** and **c**.
- page 186, Exercise 185, line 6. Insert $\prod_{d \geq 1}$ after $=$.
- page 188, Exercise 188, line 4. Change $\mathbb{F}_q$ to $\mathbb{F}_q^n$ (twice).
- page 189, line 18–. Insert the q-binomial coefficient $\binom{n}{r}$ after $\sum_{r=1}^{n}$.
- page 190, Exercise 1.190(b), line 3. Replace this line with

$$\omega^*(n, q) = q^n - q^m - q^{m-1} - q^{m-2} - \cdots - q^{\lfloor n/3 \rfloor} + O(q^{\lfloor n/3 \rfloor - 1}).$$

- page 191, third solution to Exercise 191. Change Φ to Φ_M (four times) for notational consistency.
- page 192, lines 3 and 8. Change γ_n to $\gamma(n)$.

- page 192, line 3–. insert "$/q$" before the period.
- page 193, line 2. Change $\gamma_{n-k}(q)$ to $\gamma(n-k,q)$.
- page 195, line 9–. Change "example" to "examples".
- page 196, equation (2.5). Change $Y \supseteq T$ to $Y \supseteq \emptyset$ or to just Y.
- page 198, line 3. Change $f = (T)$ to $f_=(T)$.
- page 198, line 2. This line should read:

  function $f_=$ satisfies $f_=(T) = f_=(T')$ whenever $\#T = \#T'$. Thus also $f_\geq(T)$

- page 199, line 11–. Change "i set" to "i-set".
- page 199, line 3–. Change $S - T$ to $S_n - T$.
- page 200, line 8. Change $j \geq i$ to $j \leq i$.
- page 203, line 6. Insert) before }.
- page 203, line 13. Change "nonatttacking" to "nonattacking".
- page 203, line 4–. Change "is" to "in".
- page 205, line 1. Change "revisted" to "revisited".
- page 205, line 2–. Change $m-k-1$ to $m-k+1$.
- page 206, line 9. Change "suggest" to "suggests".
- page 207, line 4–. Change $x - s_1$ to $x + s_1$.
- page 208, line 10–. Change "a_3's" to "a_3 3's".
- page 210, line 9. Insert "one for 121," after "one for 112,".
- page 210, line 9–. Insert = between $d(n)$ and $\#D_n$.
- page 212, line 3. Insert a period after $b_1 > a_1$, and raise the end of proof symbol to the same line as the period.

- pages 212–213. There is a simpler involution proof of (2.30) (equivalently, (2.5)). See pages 46–47 of B. Sagan, *The Art of Counting*.
- page 212, line 9–. Change $T \subseteq S$ to $Y \subseteq S$.
- page 216, line 5–. Insert) after x_{γ_i}.
- page 217, l. 14–. Change v to (x, y).
- page 217, l. 12–. Change v to (x, y).
- page 222, Exercise 10(b), lines 1 and 2. Change $E(n)/n!$ to $E(n)/n^n$ (twice).
- page 222, Exercise 11. This exercise is stated incorrectly. The correct statement is the following.

  (a) [3–] Fix a subset S of $[n-1]$. Let $a_1, \ldots, a_k$ be the sizes, from left-to-right, of the maximal subsets of S that are sequences of consecutive integers. For instance, if $S = \{2, 5, 6, 7, 9, 12, 13\}$ then $(a_1, a_2, a_3, a_4) = (1, 3, 1, 2)$. Write $\varphi(S) = (a_1, \ldots, a_k)$. Let $M(a_1, \ldots, a_k)$ denote the number of permutations in $\mathfrak{S}_n$ with descent set S having $n - \#S$ fixed points (the maximum possible). Show that $M(a_1, \ldots, a_k)$ is the coefficient of $x_1^{a_1} \cdots x_k^{a_k}$ in the expansion of

  $$\frac{1}{(1+x_1)(1+x_2)\cdots(1+x_k)(1-x_1-x_2-\cdots-x_k)}. \qquad (1)$$

  Example. The coefficient of x_1^{2m} is 1. If $n = 2m+1$ then this corresponds to the permutation $2m+1, 2m, \ldots, 1$ with one fixed point. The coefficient of x_1^{2m-1} is 0, since there is no permutation in $\mathfrak{S}_{2m}$ with descent set $[2m-1]$ and one fixed point.

  (b) [1+] Show that $M(a_1, \cdots, a_k)$ does not depend on the order of the numbers $a_1, \ldots, a_k$.

  (c) [2+] Show that the coefficient of $x_1 x_2 \cdots x_k$ in the expansion of equation (1) is D_k, the number of derangements in $\mathfrak{S}_k$. Deduce that the number of alternating permutations in $\mathfrak{S}_{2m}$ (or in $\mathfrak{S}_{2m+1}$) with m fixed points is D_m.

- page 223, line 4. Change $[n]$ to $[k]$.
- page 223, Exercise 13(b), line 4. Change $S' \supseteq S$ to $S' \subseteq S$.
- page 224, Exercise 14(a), line 8. Insert $+36 \cdot 5^n$ after $-36 \cdot 6^n$.
- page 225, Exercise 18, line 3. To be consistent with Exercise 17, change $w(i+j)$ to a_{i+j} and $w(i)$ to a_i.
- page 227, line 3–. On the left-hand side of the formula, remove one $\sum_{i \geq 0}$ and change y^i to t^i.
- page 229, Exercise 29(a), line 4. Change "partitions" to "compositions".
- page 235, Exercise 10(b), line 9. Change $E(n)/n!$ to $E(n)/n^n$.
- page 237, Exercise 19. Change $\binom{2n-k}{k}$ to $\frac{2n}{2n-k}\binom{2n-k}{k}$.
- page 237, line 2–. Change second a_{n-k+1} to a_{n-k+2}.
- page 245, line 8. The notation card t is not defined in the text, though it does appear on page 581.
- page 248, line 5–. Change "an" to "a".
- page 249, Proposition 3.3.2, line 1. Change "condtions" to "conditions".
- page 251, line 1–. Change $\mathcal{I}$ to S.
- page 252, line 3. Insert "simple" before "matroids".
- page 253, line 12–. Change t to v (three times).
- page 253, line 9–. In the definition of finitary distributive lattice, add the condition that L has finitely many elements of each rank. (Thus for instance the distributive lattice of all finite subsets of an infinite set is locally finite with $\hat{0}$ but not finitary.)
- page 274, line 1. Change "equation (3.27)" to "the equation above (3.23)"

- page 277, line 12–. Change $\dim(W \cup W')$ to $\dim(W + W')$.
- page 283, lines 8– to 6–. Delete the sentence "Let $\Lambda_t = \{s \in L(\mathcal{A})\colon s \leq t\}$, the principal order ideal generated by t."
- page 284, caption to Figure 3.21. Change $\mathcal{A}^K$ to $\mathcal{A}^u$.
- page 284, line 5–. In order to make the title "Deletion-Restriction" of Proposition 3.11.5 clearer, one should define $\mathcal{A}'$ to be the *deletion* of H_O from $\mathcal{A}$ and $\mathcal{A}''$ to be the *restriction* of $\mathcal{A}$ to H_0.
- page 284, line 3–. Delete "real" at the end of the line.
- page 284, line 2–. Insert "over K" after "arrangements".
- page 285, line 9. Delete "$\#\mathcal{B}_1 = \#\mathcal{B} - 1$ and".
- page 285, line 11. Under the second Σ, change $\mathcal{B}_1 \in \mathcal{A}''$ to $\mathcal{B}_1 \subseteq \mathcal{A}''$
- page 288, proof of Proposition 3.11.9. Bruce Sagan points out that it would be simpler to say that every subspace in $L(\mathcal{A})$ over $\mathbb{Z}$ is defined by a row-reduced echelon matrix over $\mathbb{Z}$, so we have good reduction over any prime p larger than all the entries of this matrix.
- page 291, line 10–. Change "sketch that" to "reference for".
- page 303, Theorem 3.15.8. To be completely accurate, one should assume that $P \neq \emptyset$.
- page 308, line 11. Insert "and equation (3.67)" after 3.15.7.
- page 308, line 9. Change "an" to "and".
- page 311, line 11 (beginning $n = 6$): change 0 to 2.
- page 312, line 12–. Change the second $=$ to $-$.
- page 313, Figure 3.33. The poset P_5 is drawn incorrectly.
- page 315, line 7. Change $a_s - a_{s+1}$ to $a_s - a_{s-1}$ (twice after the brace).
- page 317, after (3.80). The phrase "(since intervals of Eulerian posets are Eulerian)" is unnecessary since the formulas under consideration hold for any graded poset with $\hat{0}$ and $\hat{1}$.

- page 319, line 12–. Change $Q_1 * Q_2 * \cdots * Q_r$ to $R_1 * R_2 * \cdots * R_r$ (since Q_i already has been given another meaning).

- page 319, line 11–. Change the first Q_i to R_i.

- page 332, line 1–. Change γ_{j-1} to γ_{j-1}^2.

- page 332, bottom of page. Add the following paragraph:

  The proof that $(\gamma_j^*)^2 = 1$ is completely analogous. It also follows from the fact that $\gamma_j^2 = 1$, since we can assume without loss of generality that $j = p - 1$ and then apply the automorphism of G that sends each τ_k to τ_{p-k}.

- page 334, line 4. Change $z\delta$ to $z\delta_{p-1}$.

- page 336, line 11. Change $\varphi\colon \widehat{KP} \to \widehat{KP}$ to $\varphi\colon KP \to \widehat{KP}$. page 337, line 3–. Change $f(U)$ to $f(y)$.

- page 337, lines 14– to 11–. The sentence "For the algebraically minded ... formal power series." is not correct. We first need to consider non-commutative *polynomials* (not power series) and then pass to suitable completions.

- page 338, line 1–. This statement might not be so clear. Now $e^{Dx}f(U)$ is an operator, operating on power series in U, where D acts as $r\frac{d}{dU}$. Let $e^{Dx}f(U)$ act on $g(U)$. The Taylor series expansion gives

$$\begin{aligned} e^{Dx}f(U)g(U) &= f(U+rx)g(U+rx) \\ &= f(U+rx)e^{Dx}g(U), \end{aligned}$$

  so $e^{Dx}f(U) = f(U+rx)e^{Dx}$.

- page 342, line 6. Change $(1-q)^2$ to $(1-q)$ (in the denominator).

- page 345, line 4. Change $p_{s-1} + p_s$ to $p_{j-1} + p_j$.

- page 345, line 13. Change A to $\boldsymbol{A}$ (boldface).

- page 353, Exercise 3(d).

- page 354, Exercise 7(a), line 1. Change "the longest" to "a longest".

- page 356, Exercise 15(g), line 3. Change 9655 to 11586.

- page 356, Exercise 16(b). Change the difficulty rating to [3] (or maybe [3+]). See M. Guay-Paquet, A. H. Morales, and E. Rowland, DMTCS proc. **AS** (FPSAC 2013 Paris) (2013), 253–264.

- page 358, Exercise 31(b,c,d). It should be assumed that L has rank at least three.

- page 360, Exercise 38. This exercise is incorrect for $1 < k < m$, where m is the maximum size of an antichain of P. A counterexample is given by $k = 2$ and $L = J(P)$, where $P = \mathbf{1} + (\mathbf{1} \oplus (\mathbf{1} + \mathbf{1}))$. It is true that $\#P_k = \#R_k$, even for modular lattices. See Exercise 3.101(d).

- page 360, Exercise 41(c,d). It is assumed that L is distributive.

- page 360, Exercise 41(d), line 2. after t_i insert ", $0 \leq i \leq m$".

- page 363, Exercise 50, line 4. Change $i \leq j \leq 0$ to $i \geq j \geq 0$.

- page 363, Exercise 51, line 2. Not an error, but to be consistent with the rest of the exercise it would be better to use n rather than i (twice).

- page 364, Exercise 55(b). The rating should be changed to [3–]. An exceptionally elegant proof was given by G. Stachowiak, *Order* **5** (1988), 257–259. Another elegant proof was given by B. Iriarte, `arXiv:1405.4880`. Iriarte proves the more general result that if G is the comparability graph of a poset P, then the number of linear extensions of $(G, \mathfrak{o})$ is maximized when $\mathfrak{o}$ respects the order P.

- page 366, Exercise 62(g), line 2. Change $m \geq 0$ to $n \geq 0$ (under the summation sign).

- page 366, Exercise 62(g), line 2. Change $U_{P_n}(x)$ to $G_{P_n}(x)$, where $G_{P,\omega}(x)$ is defined in Section 3.15.2, and as usual we suppress the notation ω in the case of natural labelings. Equivalently, for any finite labelled poset (P, ω),

$$U_{P,\omega}(x) = \lim_{m \to \infty} U_{P,\omega,m}(x).$$

- page 374, Exercise 95. The stated identity is actually valid for the *dual* Möbius algebra, where one uses the join operation rather than the meet. The correct identity using the text definition of Möbius algebra is

$$\sum_{t \in L} \mu(t, \hat{1})t = \left(\sum_{u \geq z} \mu(u, \hat{1})u \right) \cdot \left(\sum_{v \vee z = \hat{1}} \mu(v, \hat{1})v \right).$$

- page 375, Exercise 96(d). This result was proved by Braden, Huh, Matherne, Proudfoot and Wang (difficulty rating [4]). For a survey, see T. Braden, J. P. Matherne, and N. Proudfoot, *Notices AMS*, to appear; `https://pages.uoregon.edu/njp/whatisNotices.pdf`.

- page 375, Exercise 98, line 3. Change $\leq$ to $\geq$.

- page 376, Exercise 101(f). Difficulty level [2+].

- page 378, Exercise 114(a). The answer should be

$$(x-1)(x-2)\cdots(x-n).$$

- page 379, Exercise 115(c), line 1. Change "0,1" to 0. (There are $\binom{n}{2}$ hyperplanes.)

- page 379, Exercise 116. The subscripts should not be in boldface.

- page 385, Exercise 131, lines 10–13. The definition of the partial ordering is incorrect. We should define $\alpha \leq \beta$ if every block $B \in \beta$ is a union of blocks $A_{i_1}, \ldots, A_{i_k}$ of α (and that the restrictions of the labelings agree).

- page 387, Exercise 3.139. The right-hand side of the displayed formula should be $2x(1+x)^{n-2}/(1-x)^n$.

- page 387, Exercise 141, line 3. Change $\sum_{i \geq 1}$ to $\sum_{i \geq 0}$.

- page 387, line 7–. It should be said that Q_0 is defined in the previous exercise.

- page 388, Exercise 145, line 3. Change 3.15.10 to 3.15.12.

- page 388, Exercise 149, line 4. Change $1 \leq i, k \leq r$ to $1 \leq i, j \leq r$.

- page 390, Exercise 158(a), line 4. Change **a.** at beginning of line to **i.**.
- page 390, Exercise 158(a), line 5. Change **b.** at beginning of line to **ii.**.
- page 390, Exercise 158(c). Delete one of the periods at the end of the line.
- page 390, Exercise 158(d), line 2. Change "thats" to "that".
- page 390, Exercise 158(e), line 1. Change $k(kt)!^{t-2}$ to $k(kt)^{t-2}$.
- page 403, Exercise 189. NOTE. The result is also true for d odd, but the proof is quite a bit easier.
- page 404, Exercise 198. It should be mentioned that butterfly posets are also called "ladder posets," since there is an index entry for "poset, ladder."
- page 405, line 8–. The notation f_{00} is not defined until the next sentence.
- page 406, line 1–. Change $\mathrm{des}(w)$ to $\mathrm{asc}(w)$.
- page 407, line 1. Change $\mathrm{des}(w)$ to $\mathrm{asc}(w)$, and change "descents" to "ascents".
- page 407, line 3. Change $z\sum_{n\geq 1}$ to $\sum_{n\geq 1}$ (twice).
- page 407, line 5. Change $(x-1)^{n-1}$ to $(z-1)^{n-1}$.
- page 407, Exercise 205(b), line 2. Change 44605 to 44606 (private communication from Patrick Byrnes, 21 February 2012). Byrnes originally assumed that a vertex v could be covered by at most one singleton (element covering only v), but there is exactly one example up to rank 9 where this property need not hold. Byrnes also computes that there are 29,199,636 1-differential posets up to rank 10.
- page 408, Exercise 211, line 3. Change the numerator $r^2+(r+1)q-q^2$ to $r^2+r(r+1)q-rq^2$.

- page 408, Exercise 215(c). Change the difficulty rating [5] to [3]. See A. Miller, *Order* **30** (2013), 657–662, `arxiv.org/abs/1202.3006`, and C. Gaetz and P. Venkataramana, *Order* **37** (2020), 279–286; `arxiv.org/abs/1806.03509`.

- page 411, line 8–. Change **f.** to **g.**.

- page 411, line 8–. Change (e) to (f).

- page 412, Exercise 16, line 2. Update the reference to *J. Combin. Theory Ser. A* **120** (2013), 1305–1327.

- page 413, Exercise 26, line 2. We can't replace $\mathbb{N}^*$ with $\mathbb{Z}$ since $\mathbb{Z}$ doesn't have a $\hat{1}$.

- page 415, Exercise 36(b). This example is incorrect. For instance, $\{1,2,3\}$ and $\{1,2,4,5\}$ have no meet.

- page 416, Exercise 41(a), line 3. Change "dominance" to "lexicographic".

- page 416, Exercise 47(b). Bruce Sagan points out that this exercise can be given a more intuitive, noninductive proof.

- page 418, line 5. To verify this identity, we must use the fact that $2 \leq r \leq k$. (We are assuming $r > 1$, and if $r > k$ then the meet of elements covered by t has rank $k - r < 0$.)

- page 426, Exercise 87(d), line 1. In addition to Example 3.9.6, we are also using the fact (immediate from the definition of meet-distributive) that if $[s,t]$ is an interval of a meet-distributive lattice for which s is the meet of elements in $[s,t]$ covered by t, then $[s,t]$ is boolean, together with Corollary 3.9.5.

- page 426, Exercise 87(d). One should define a chain $t_0 < t_1 < \cdots < t_k$ to be *boolean* if every interval $[t_{i-1}, t_i]$ is a boolean algebra. Also define ℓ to be the length of the interal $[t_0, t_k]$.

- page 426, Exercise 88. Another solution is the following. We have

$$\sum_{s \leq t} \mu(s,t) = \sum_{s} \sum_{t \geq s} \mu(s,t).$$

By the definition (3.15) of μ, this latter sum over t is 0 if $t \neq \hat{1}$ and is 1 if $t = \hat{1}$, and the proof follows. Note that this proof only requires P to have a $\hat{1}$. More generally, we leave the reader to show that for *any* finite poset P, $\sum_{s \leq t} \mu(s,t) = 1 + \mu_{\widehat{P}}(\hat{0}, \hat{1})$, where $\widehat{P}$ denotes P with a $\hat{0}$ and $\hat{1}$ adjoined.

- page 427, Exercise 96(a), line 7. Change $[F(s \wedge t), s]$ to $[F(s \wedge t, s)]$.
- page 429, line 9. Change "that" to "then".
- page 429, line 12. The sum is not empty, but all terms u satisfy $u \notin B$. Hence $f(u) = 0$.
- page 429, line 13–. Change T^* to t^*.
- page 430, Exercise 102(a). Considerable further progress (but not a complete solution) has been made. See the Wikipedia article "Union-closed sets conjecture."
- page 431, line 5. Change $v \geq u$ to $v \leq u$.
- page 431, line 2–. Change **23** to **33**.
- page 434, line 9–. Change $p > 2$ to $p > 2n - 1$.
- page 437, line 11. Not the best notation, since $x \| y$ also means that x and y are incomparable in a poset.
- page 439, Exercise 130, line 1. insert $-\{\hat{0}\}$ after Q_i.
- page 440, Exercise 135, line 1. Change 3.12 to 3.13.
- page 445, Exercise 151, line 3. Change the second $+1$ (subscript) to $+2$.
- page 449, Exercise 163(a), line 3. Change $2e_P(p-1) - (p-1)e(p)$ to $(2e_P(p-1) - (p-1)e(P))/p!$.
- page 458, Exercise 185. Part **f.** should be **k.**, and **g.** should be **l.**
- page 459, line 5–. Should be $\beta_P(4,5,6) = -1$.
- page 465, line 7–. Change "degree j" to "degree $j-1$".

- page 468, Proposition 4.2.2, line 5. Change the period after E_f to a comma.
- page 469, line 6–. Change $\sum_{n\geq 0} f(n)$ to $\sum_{n\geq 0} f(n)x^n$.
- page 511, line 18–. Change (v, b_i) to $(v, i),\ 1 \leq i \leq k$.
- page 522, Figure 4.29. The vertex labels should be 0 and 1, not 00 and 10.
- page 528, Exercise 4.2, line 3. Change "over" to "in".
- page 530, Exercise 4.12. Change $0.00010203050813213455\cdots$ to $0.000101020305081321345 5\cdots$, and change $1, 2, 3$ to $1, 1, 2, 3$.
- page 530, Exercise 4.14, line 2. Insert "relatively prime" after "choose a, b".
- page 531, Exercise 22, line 1. Change $\alpha \in \mathbb{C}$ to $0 \neq \alpha \in \mathbb{C}$.
- page 532, Exercise 25(e), line 3. Change $N_1(m)$ to $N_1(2^m - 1)$.
- page 532, Exercise 25(e), line 5. Change $N_1(m)$ to $N_1(q^m - 1)$ and $N_{-1}(m)$ to $N_{-1}(q^m - 1)$.
- page 532, Exercise 25(e), line 8. Change $N_1(m)$ to $N(2^m - 1)$.
- page 532, Exercise 25(e), line 10. Change $N_1(m)$ to $N_1(2^m - 1)$.
- page 533, line 2. Change $N_1(m)$ to $N_1(2^m - 1)$.
- page 533, line 5. Change $N_1(m)$ to $N_1(2^m - 1)$.
- page 533, line 7. Change $N_1(m)$ to $N_1(3^m - 1)$.
- page 533, line 8. Change $N_2(m)$ to $N_2(3^m - 1)$.
- page 533, line 10. Change $N_1(m)$ to $N_1(3^m - 1)$.
- page 533, line 11. Change $N_2(m)$ to $N_2(3^m - 1)$.
- page 539, Exercise 47, line 1–. Change 1.1.8.6 to 1.8.6.
- page 542, line 4. Change $n \times n$ to $(n + 1) \times (n + 1)$.

- page 542, line 10. Delete) after u_6.

- page 544, Exercise 4.66(b), line 2. Change "each i-face" to "the affine span of each i-face".

- page 546, Exercise 4.75(d). Change the difficulty rating to [3–]. A combinatorial proof (though not a simple bijection) was found by Jacob Scott, private communication dated September 2, 2012.

- page 548, Exercise 2(a), line 6. The assertion "Clearly, we can write $f(x) = P(x)/Q(x)$ for some relatively prime integer polynomials P and Q." is not so clear. One must show that if $F(x) \in \mathbb{Q}[[x]]$ and $F(x) = R(x)/S(x)$ where $R, S \in \mathbb{C}[x]$, then one can write $F(x) = P(x)/Q(x)$ where $P, Q \in \mathbb{Q}[x]$. This statement does have a fairly simple proof, which we leave as an exercise.

- page 549, line 1–. Change x^{m^2} to x^{n^2}.

- page 552, Exercise 14. The smallest known pair (a, b) seems to be

$$\begin{array}{rcrcl} a & = & 106276436867 & = & 31 \cdot 3128272157 \\ b & = & 35256392432 & = & 2^4 \cdot 2203524527 \end{array},$$

  due to M. Vsemirnov, *J. Integer Seq.* **7** (2004), article 04.3.7.

- page 557, line 4–. Change x^ℓ to x^l.

- page 558, line 1. Delete comma after *Wochenschrift*.

- page 558, Exercise 43. The sequence $t(3), t(4), \ldots$ is known as *Alcuin's sequence*, after Alcuin of York (730s or 740s – 19 May 804). For a survey see D. J. Bindner and M. Erickson, *Amer. Math. Monthly* **119** (2012), 115–121.

- page 560, Exercise 46(b), line 1. Delete the first "many".

- page 560, Exercise 46(b), line 2. Change $f(n+1), f(n+2), \ldots, f(n+d)$ to "$(f(n+1), f(n+2), \ldots, f(n+d))$ for fixed d".

- page 564, Exercise 58(f), line 1. Change "order polynomials" to "Ehrhart polynomials".

- page 567, Exercise 75(c), line 1. Delete "directed".
- page 569, Exercise 80, displayed equation, line 1. Change $v_i' y$ to $v_i y$.
- page 570, Exercise 82(e,f). For the paper of J. Schneider, see *Electronic J. Combinatorics* **21** (2014), P1.43; `arXiv:1206.6174`.
- page 571, line 3. Change "chose" to "chosen".
- page 578. The following item is missing: First edition—Supplementary Exercise 1.7 = Second edition—Exercise 1.114(b).
- page 579. The following three items are missing: First edition—Supplementary Exercise 3.19 = Second edition—Exercise 3.44; First edition—Supplementary Exercise 3.10 = Second edition—Exercise 3.63; and First edition—Supplementary Exercise 3.17 = Second edition—Exercise 3.189.
- page 620, Stembridge entry, line 6. Change $q = 1$ to $q = -1$.