Comments and corrections, Combinatorics: The Rota Way. November 2009

This is a list of errors of omission or commission known to us in November 2009. We welcome messages to us about the book: kung@unt.edu, cyan@math.tamu.edu.

Chapter 2. Page 52. The Putnam problem is not stated correctly. The last sentence should read

Show that there exists a permutation π of $\{1, 2, \ldots, \}$, matching the red points with the blue points, such that no pair of finite line segments $\overline{r_i b_{\pi(i)}}$ and $\overline{r_j b_{\pi(j)}}$ crosses – that is, no such pair intersects at exactly one point in their interior.

Chapter 3. Page 157.

Line -15. "Whether this equality holds for $n \geq 4$ is unknown." In fact, this is known and it is false.

Line -4. We should have noted that Haiman's proof theory does not imply that the universal Horn theory of linear lattices is decidable. It is not. See, for example, G. Hutchinson, Recursively unsolvable word problems of modular lattices and diagram-chasing, J. Algebra 26 (1973) 385–399; L. Lipshitz, The undecidability of the word problems for projective geometries and modular lattices, Trans. Amer. Math. Soc. 193 (1974) 171–180.

Chapter 4. Page 180. The proof of Theorem 4.1.1 has a major but fixable flaw – a "gaffe" as Rota would say. To fix this, replace the second sentence in the proof by

The number of ways to choose a partition $B_1, B_2, \ldots, B_c$ of $\{1, 2, \ldots, n\}$ such that $|B_i| = n_i$ is

$$\frac{n!}{a_1!a_2!\cdots a_n!n_1!n_2!\cdots n_c!}$$

where a_i is the number of parts n_j such that $n_j = i$. On the block B_i, there are $|\mathcal{C}_{n_i}|$ ways of putting an atom. Hence, the total number of molecules on $\{1, 2, \ldots, n\}$ with c components is

$$\sum_{n_1, n_2, \ldots, n_c} \frac{n!}{a_1!a_2!\cdots a_n!n_1!n_2!\cdots n_c!} |\mathcal{C}_{n_1}||\mathcal{C}_{n_2}|\cdots|\mathcal{C}_{n_c}|$$

The product formula now follows from the multinomial theorem.