

PREFACE

Professor Doron Zeilberg's name was misspelled (page vi) in the reference to a paper of his. Apologies.

CHAPTER 1

We thank Professor Junro Sato of Kochi University for pointing out an error in Definition 1.1(i).

Definition 1.1 (i) A function f is said to be one-one if $x, y \in X$ satisfies $f(x) = f(y)$ then $x = y$.

Example 1.27 The argument - and hence the diagram (Figure 1.3) - are wrong. We are grateful to Professor Dave Bayer of Barnard College, Columbia University for pointing this out. The problem is that: $\binom{r}{k} (r - k)!$ does count the permutations with k fixed points, but with replications. His ingenious solution is that there are: $\binom{r}{k} (r - k)!$ permutations with k marked fixed points, and possibly other, unmarked fixed points. In using the inclusion and exclusion principle the unmarked fixed points are also sieved out.

Another argument is as follows: there are $r!$ permutations of r objects. Let α_k be the set of permutations that leave the k th object fixed. Then $\sum_i \#(\alpha_i)$ is made up of terms in which 1 element is fixed and those remaining may be permuted: $\sum_i \#(\alpha_i) = (r - 1)! + (r - 1)! + \cdots + (r - 1)! = \binom{r}{1} (r - 1)!$. Similarly, $\sum_{i \neq j} \#(\alpha_i \alpha_j)$ is made up of terms in which 2 elements are fixed and those remaining are permuted: $\sum_{i \neq j} \#(\alpha_i \alpha_j) = (r - 2)! + (r - 2)! + \cdots + (r - 2)! = \binom{r}{2} (r - 2)!$ and so on. Then by the principle of inclusion and exclusion, the number of permutations with no fixed points is $d_r = r! - \binom{r}{1} (r - 1)! + \binom{r}{2} (r - 2)! - \cdots = \sum_{k=0}^r (-1)^k \binom{r}{k} (r - k)!$. (1.1) This is the required explicit expression for derangements.

Chapter 2

Example 2.2 In part (ii) the $+$ sign on the left should be $-$ so the solution starts: $(2 - 3z)^{-7} = 2^{-7} \left(1 - \frac{3z}{2}\right)^{-7} = \cdots$.

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