

# Review

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Final

1. 4 basic counting principles
2.  $k$ -permutations and  $k$ -combinations of sets
3. Permutations of multisets
4. Combinations of multisets and ~~Probability~~
- 5-6. Pigeonhole principle
- ~~7. Ramsey Theory~~
- ~~8. Generating permutations & inversions~~
- ~~9. Generating combinations~~
- ~~10. Partial orders and equivalence relations~~
- 11-12. Binomial coefficients and their properties
13. ~~Sperner Theorem~~ and Multinomial Theorem
14.  $\binom{x}{k}$  as a polynomial
- ~~15. More on posets~~
16. Inclusion-Exclusion formula and applications
- ~~17-18. Derangements and Permutations with restrictions~~
- ~~19. Some combinatorial number theory~~
- ~~20. Fibonacci sequence~~
21. Generating functions
22. Exponential Generating Functions
- 23-25. Linear recurrence relations I-III
- 26-27. Catalan numbers I-II
- ~~28-29. Stirling numbers of 1st and 2nd kind~~
30. Partition numbers
31. Basic properties of graphs
32. Connected components and Eulerian Trails
33. Open Eulerian trails
35. Hamiltonian paths and cycles and Bipartite Graphs
36. ~~Knights' tour problem~~ and Trees
37. Trees
38. ~~The Shannon Switching Game~~