

HOMEWORK

1. Chapter 1, Exercise 1.
2. Chapter 1, Exercise 2.
3. Label each of the triangles of the barycentric subdivision of the 3-dimensional cube with the appropriate reflection. Can you conclude anything interesting?
4. For a permutation $\pi = \pi_1 \cdots \pi_n$ in the symmetric group S_n on n elements, define the inversion statistic by $\text{inv}(\pi_1 \cdots \pi_n) = \#\{(i, j) : i < j \text{ and } \pi_i > \pi_j\}$. Prove that

$$\sum_{\pi \in S_n} q^{\text{inv}(\pi)} = [n][n-1] \cdots [1] = [n]!,$$

where $[k] = 1 + q + \cdots + q^{k-1}$.

5. Chapter 1, Exercise 4.
6. Chapter 1, Exercise 9.
7. Chapter 1, Exercise 10.
8. Chapter 2, Exercise 2.
9. Chapter 2, Exercise 4.
10. Chapter 2, Exercise 5.
11. Chapter 2, Exercise 6.
12. Chapter 2, Exercise 7.
13. Chapter 2, Exercise 13.
14. Chapter 2, Exercise 14.
15. Chapter 2, Exercise 18.
16. Chapter 2, Exercise 19.
17. Chapter 2, Exercise 24.
18. Chapter 2, Exercise 32.
19. Chapter 2, Exercise 35.