

Problem Set XI

1. There are three towns, Aliceville, Bandersnatch Hollow, and Cheshire, in Wonderland. 3 roads connect Aliceville and Bandersnatch Hollow, and 2 roads connect Bandersnatch Hollow and Cheshire.

(a) How many different routes can one take from Aliceville to Cheshire? (Assume that you are only allowed to travel from Aliceville to Bandersnatch Hollow and from Bandersnatch Hollow to Cheshire.)

(b) A new town, Dodo Park, was founded in Wonderland, and 4 new roads leading from Cheshire to Dodo were built. How many different routes can one take from Aliceville to Dodo Park? (Again, assume that you are allowed to travel only in the direction from Cheshire to Dodo Park.)

(c) A new metropolis, Tweedlewood, was founded in Wonderland, and several more roads were built: 2 roads from Aliceville to Tweedlewood and 1 road from Tweedlewood to Dodo Park. How many different routes can one take from Aliceville to Dodo Park now?

2. The alphabet of the planet Far Far Away has four letters only: A, B, C and D. The planet is divided into two kingdoms: Talkers and Chatterers.

(a) In the kingdom of Chatterers, a first name could be any three-letter word composed of letters A, B and C. How many different first names do they have in this kingdom?

(b) In the same kingdom, a last name could be any four-letter word composed of letters A, B, C and D. However, any last name should end with the letter D. How many different last names do they have in this kingdom?

(c) In the kingdom of Talkers, a first name could be any word composed of letters A, B and C. The name should be no longer than 3 letters. How many different first names do they have in this kingdom?

(d) In the same kingdom, a last name could be any four-letter word composed of letters A, B, C and D. However, any last name should have just one letter D in it, and this letter should be either the first or the last letter of the last name. How many different last names do they have in this kingdom?