P3: Backtracking in Prolog

1. Given N 2D coordinates, find all colinear subsets.

2. Given an integer N, find all ways to express the number as a sum of distinct primes.

3. Given a list $a_1, ..., a_n$, find all strictly increasing sublists.

4. Given two natural numbers, n and m, find all possible ways of aranging the numbers between 1 and n such that the absolute difference between two adjacent numbers is m.

5. Find all size N sublists of a list. E.g., [2,3,4] N=2 $\Rightarrow$ [[2,3],[2,4],[3,4]]

6. Find all lists of N correctly closed pairs of paratheses. E.g., n=4 (()) si ()()

7. Find all arangements of size K of a list. E.g., [2,3,4] K=2 $\Rightarrow$ [[2,3], [3,2], [2,4], [4,2], [3,4], [4,3]], not necesarily in this order

8. A sports bet player wants to bet on 4 soccer matches. The bets can be 1,X,2. Find all bes knowing that the last bet can't be 2 and there can be no more than two X bets.

9. Given a value N, find all permutations of N elements knowing that for any value i, $2 \leq i \leq n$, there exists j, $1 \leq j \leq i$, such that $|p(i) - p(j)| = 1$.

10. Given a list of distinct integers $a_1, ...a_n$, find all sublists wohs sum is divisible by n.

11. Find all sublists of length $2n + 1$ containing 0, -1, or 1, such that $a_1 = 0$, $a_{2n+1} = 0$ and $|a_{i+1} - a_i| \in \{1, 2\}$

12. Given a list of distinct integers, find all sublists resembling a mountain, i.e., the sublists starts with an ascending sequence followed by a descending sequence. E.g., (10 16 27 18 14 7).

13. Given a graph of n countries on a map where the nodes a the countries and te edges represent that the two countries are neigbours. Find all ways to color n countries with m colors where no two neighbouring countries share a color.

14. Find all sublists that sum up to S of a list. E.g., [1,2,3,4,5,6,10] si S=10 $\Rightarrow$ [[1,2,3,4], [1,4,5], [2,3,5], [4,6], [10]] not necesarily in that order.

15. Given a pozitive number, find all ways of expressing that number as a sum of consecutive natural numbers.