CS 161 (Stanford, Fall 2025) Section 7 Extra

1 Pareto Optimal

Given a set of 2d points P, a Pareto optimal point is a point (x, y) such that $\forall(x', y')$ we have either $x > x'$ or $y > y'$. Develop an algorithm to to find all Pareto optimal points.

2 Roads and Airports

Given a set of n cities, we would like to build a transportation system such that there is some path from any city i to any other city j. There are two ways to travel: by driving or by flying. Initially all of the cities are disconnected. It costs r_{ij} to build a road between city i and city j. It costs a_i to build an airport in city i. For any two cities i and j, we can fly directly from i to j if there is an airport in both cities.

Give an efficient algorithm for determining which roads and airports to build to minimize the cost of connecting the cities.