Introduction

The company RoboMarkt specializes in installing and servicing automatic grocery stores that sell goods in remote areas of a sparse country, where traditional stores are anti-economical. These automatic stores ("stores" from now on) sell food and beverages as well as house goods such as toiletries and books.

A feasibility study identifies a new remote area where these stores can be installed. The region has n small villages, whose coordinates in kilometers are described by parameters `Cx` and `Cy`. Despite their remoteness, these villages are well-connected to one another so that the traveling distance between each village can be approximated by their Euclidean distance.

Installation

RoboMarkt wants to install a store in one or more of the villages in N and needs your help deciding where. Not all villages gave permission to install such stores. Whether or not it is possible to build a store at village i is described by parameter `usable[i]`. All considered, the cost of building a mini-market at house i is `Dc[i]`. The company wants to plan the construction of stores so that each village is at most `range` kilometers away (euclidean distance) from an open store.

Maintenance

The main branch of the company for the region is based at location 1. For image reasons, a store at location 1 should always be built. All stores must be refilled periodically. The company branch plans to hire truck drivers to refurbish the stores every Monday, planning the routes so that all stores are visited by a truck. The store at location 1 does not need to be refurbished by a truck, since it is located at the main branch.

Each truck is assigned a route that start and end at location 1. A single truck has the capacity to and visits up to `capacity` stores (excluding the store at location 1).

The company has arranged to hire each driver for a fixed fee of `Fc`. In addition to the driver fee, the company also pays an additional fee of `Vc` for each kilometer drove by a truck, to account for both the time of the driver and the cost of the gas used.

Problem

The company wants to know where it should install these stores and with what routes every truck should serve them so that the costs (building plus refurbishing costs) are minimized.