Problem D
Motorway Paths

Input File: D.DAT
Program Source File: D.PAS or D.C or D.CPP

A road building company plans to build a motorway between two towns. In the early phases of design the company uses a satellite digitized map for computing the best paths for the motorway. The map is represented on a two dimensional grid as a set of points enclosed within a rectangular contour. The contour of the map and the obstacles on the map are marked using the character with the decimal code **219**. The free points on the map (where the motorway can pass through) are marked by characters with the decimal codes **176**, **177**, and **178**. The towns are marked using the character with the decimal code **1**. There are exactly two towns on the map. The markings for free points, towns and obstacles can appear inside the map contour only and there are no other markings on the map.

A path between two map points runs vertically and/or horizontally through the free points on the map. A free point whose decimal code is **point_code** requires **(point_code - 175)** cost units for building the motorway part which passes through that point. The cost associated with the town points is **0**. The length of the path is the number of its points, including the town points. The compound cost of a path is the sum of the path length plus the building cost of its points. The best motorway path has a minimal compound cost.

Write a program that, for each map read from a text file, finds all possible best paths between the two towns on the map and marks these paths using the character with the decimal code **32** (space). All paths are marked on the same map. The towns preserve their initial markings
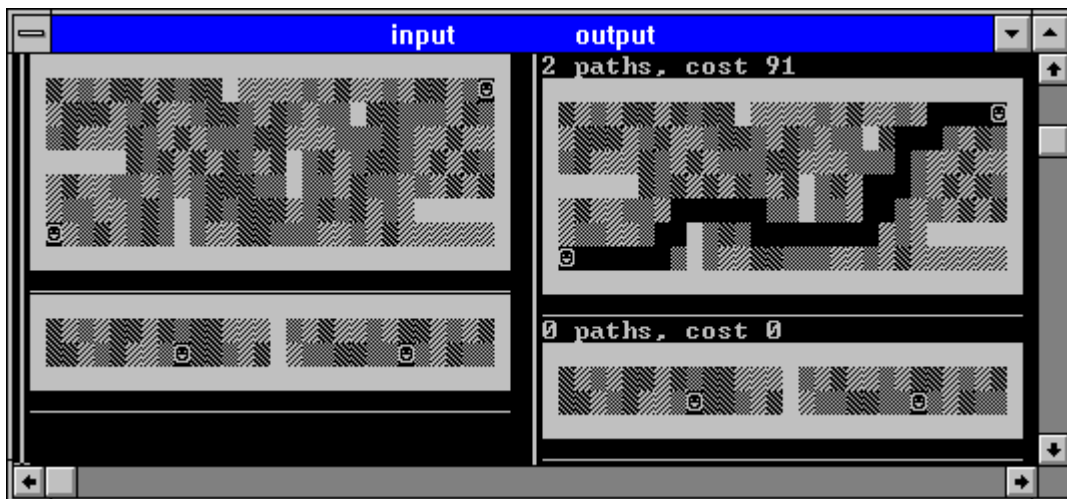

Figure 1. An input and output sample of the program

A map is read as a sequence of text lines terminated by a line full of underscores. There are at most **30** lines, including the termination line, and at most **80** characters in a line for each map. Input data are correct. The standard output file contains the maps with the marked paths. Each map is output in the same format it is read from the input file, including the termination line, and is preceded by a line that shows the number of the best paths and their cost (**0** for non existing paths) as shown in figure 1. The number of the best paths can be pretty large.