

2.0 4.0

0

Corresponding Output

2.2

10.0

3.41

Grading (what to turn in)

What	Points	Due Tuesday April 19th
External Documentation	14	
Your Name	1	
Description of the problem	1	
Input Specification	1	
Output Specification	1	
Algorithm Description & Design UML	10	
Data Structure	12	
main data structures	5	
member functions / functions pre/post conditions for each	2	
Implementation and discussion.	5	
Analysis	11	
Worst case time analysis for each function	3	
Worst case space analysis for each function	3	
Test Plan	3	
Sample Runs	3	
Program Listing Style	13	
Your Name	1	
Description of the problem	1	
Variable Names	2	
Data Dictionary	2	
Pre/post conditions	3	
Length of functions	3	
Use of white space	1	
Functionality	50	
Main	5	
works	45	

Purpose Programming with Graphs**Due Tuesday April 4th (team of 2 member list and names****In this project teams are mandatory)****Due Tuesday April 19th**

In this project we assume that the oil companies have finally gotten permission to drill for oil in the Alaskan National Wildlife Reserve (ANWR). The oil exploration companies have already picked out sites where they want to drill and specified them on a map of the area. Each site is denoted by an x and y grid coordinates from a map. No roads have as yet been built and this is where your team of two cracker jack programmers/environmentalists come in. You have been hired by the Alaskan Conservation Membership (ACM) to try and minimize the damage the exploration does to the environment by choosing where the roads will be built in order to connect to all exploration sites and yet to minimize the total length of roads to build. (Note: this will also be the cheapest roads to build in terms of raw materials). All roads are just line segments whose endpoints are exploration sites. Your final road will all be connected.

Input

All interactions will be done through the keyboard. Input will consist of a number of test cases. Each test case starts with the integer n on one line by itself, which represents the number of exploration sites. The next n lines will consist of x and y map coordinates (separated by a space) which are written to 1 decimal point accuracy in the range of 0 to 100. The end of input will be signaled by a 0 as the number of exploration sites.

Output

All output is to the screen and must match EXACTLY. For each test case write the length of the total roads that need to be built. All answers will be rounded to the nearest tenth.

Sample Input

```
3
1.0 1.1
1.0 2.2
1.0 3.3
4
4.0 4.0
10.0 4.0
4.0 6.0
2.0 4.0
3
1.0 1.0
2.0 2.0
```