Problem 2: Tracking A Run

Overview

Consider two runners confronted with a perfectly hemi-spherical hill of height 100 meters. Each is at the southern point of the base of the hill. Pat chooses to run due north to the (base at the) north end of the hill. Pat will travel 200 meters (the diameter of the sphere) and will both climb and descend 100 meters. On the other hand, Chris chooses to run around the hill. This will result in 0 meters ascended and 0 meters descended, but Chris will travel 314 meters (rounded to the nearest meter.) This is a longer, but flatter run. A GPS track of Pat’s run would show a straight line, but a GPS track of Chris’ run would show a semi-circular path.

Problem

Modern GPS watches gather data at particular intervals (say every two seconds) locating their wearers in both an (x,y) plane and measuring their elevation. This data can be used to compute the climb up, the climb down, and the total (planar) distance traveled. For a given running session, each of these is computed based upon pairs of consecutive points and is then totaled for the trip. (Any rounding is to the nearest integer and occurs at the end of the trip, not at each particular location.)

Input

The first line of input will consist of K indicating the number of “data points,” where K is between 2 and 1000 inclusive. This will be followed by the K data points themselves. Each data point consists of three integers indicating the x-, y-, and z- locations (where z- represents elevation). All coordinates are integers between -10000 and +10000 (inclusive). Integers are separated by single spaces.

Output

The output consists of a single line of text reporting the run, formatted as in the examples. Altitude gained or lost will always (necessarily) be integral and should be reported exactly. The total distance (computed using only x- and y- coordinates) will probably not be integral; that quantity should be computed exactly and then rounded to the nearest integer before reporting the data. (Single spaces separate all output elements.)
Example 1

Input

4
0 0 0 3 4 10 7 7 12 10 11 5

Output

Distance: 15, Climb: 12, Descent: 7

Example 2

Input (pay no attention to the line wrap or margins)

7
0 0 0 -123 423 -10 213 219 41 103 102 39 5 56 5 2 2 9 -3 1924 -2

Output

Distance: 3079, Climb: 55, Descent: 57