

Weekly Coding Session 6

Report Repair

You've decided to take a vacation at a nice resort on a tropical island. Before you leave, the Elves in accounting just need you to fix your expense report (your puzzle input); apparently, something isn't quite adding up.

Specifically, they need you to find the two entries that sum to 2020 and then multiply those two numbers together.

For example, suppose your expense report contained the following:

1721

979

366

299

675

1456

In this list, the two entries that sum to 2020 are 1721 and 299. Multiplying them together produces $1721 * 299 = 514579$, so the correct answer is 514579.

Of course, your expense report is much larger. Find the two entries that sum to 2020; what do you get if you multiply them together?

Sonar Sweep

You're minding your own business on a ship at sea when the overboard alarm goes off! You rush to see if you can help. Apparently, one of the Elves tripped and accidentally sent the sleigh keys flying into the ocean!

As the submarine drops below the surface of the ocean, it automatically performs a sonar sweep of the nearby sea floor. On a small screen, the sonar sweep report (your puzzle input) appears: each line is a measurement of the sea floor depth as the sweep looks further and further away from the submarine.

For example, suppose you had the following report:

199, 200, 208, 210, 200, 207, 240, 269, 260, 263

This report indicates that, scanning outward from the submarine, the sonar sweep found depths of 199, 200, 208, 210, and so on.

The first order of business is to figure out how quickly the depth increases, just so you know what you're dealing with – you never know if the keys will get carried into deeper water by an ocean current or a fish or something.

To do this, count the number of times a depth measurement increases from the previous measurement. (There is no measurement before the first measurement.) In the example above, the changes are as follows:

199 (N/A - no previous measurement)

200 (increased)

208 (increased)

210 (increased)

200 (decreased)

207 (increased)

240 (increased)

269 (increased)

260 (decreased)

263 (increased)

In this example, there are 7 measurements that are larger than the previous measurement.

How many measurements are larger than the previous measurement?

Population Density

You are working on a data analysis project at Deloitte where you need to analyze a dataset containing information about various cities. Your task is to calculate the population density of these cities, rounded to the nearest integer, and identify the cities with the minimum and maximum densities.

The population density should be calculated as (Population / Area).

The output should contain 'city', 'country', 'density'.

DataFrame: cities_population

city	country	population	area
Metropolis	Countryland	1000000	500

Smallville	Countryland	50000	1000
Coastcity	Oceanland	300000	0
Starcity	Mountains	600000	600
Gotham	Islander	1500000	300
Rivertown	Plainsland	100000	5000
Lakecity	Forestland	100000	5000
Hilltown	Hillside	200000	450
Forestville	Forestland	500000	700
Oceanview	Seaside	800000	0

Next Permutation

Given an array `Arr[]` of integers, rearrange the numbers of the given array into the lexicographically next greater permutation of numbers.

If such an arrangement is not possible, it must rearrange to the lowest possible order (i.e., sorted in ascending order).

Example 1:

Input format: `Arr[] = {1,3,2}`

Output: `Arr[] = {2,1,3}`

Explanation: All permutations of {1,2,3} are {{1,2,3}, {1,3,2}, {2,1,3}, {2,3,1}, {3,1,2}, {3,2,1}}. So, the next permutation just after {1,3,2} is {2,1,3}.

Example 2:

Input format: `Arr[] = {3,2,1}`

Output: `Arr[] = {1,2,3}`

Explanation: As we see all permutations of {1,2,3}, we find {3,2,1} at the last position. So, we have to return the topmost permutation.
