TOBB ETÜ, BİLGİSAYAR MÜHENDİSLİĞİ BÖLÜMÜ

BİL 113/012 Computer Programming I

HOMEWORK 2 (30 Points)

Oct 25, 2020

1 [8 POINTS] REPHRASING IF SENTENCES I

In English, comma should be used after the *if-clause* if the *if-clause* precedes the main clause. For example, "If I'd had time, I would have cleaned the house.". If the main clause precedes the if-clause, no punctuation is necessary.". For example, "I would have cleaned the house if I'd had time.". Notice that *if* in the second example start with lowercase letter.

In the first question, you will write a Java program which takes a sentence in which the if-clause precedes the main clause, and outputs the sentence so that the main clause precedes the if-clause with correct case and punctuation. You can check the complete examples below.

You can assume that there is only one comma in input sentences. Green texts are inputs.
EXAMPLE 1
Please enter the sentence:If I would had time, I would have cleaned the house.
Repharased sentence: I would have cleaned the house if I would had time.

EXAMPLE 2
Please enter the sentence:If the cinema had been open, we would have seen The Two Towers.
Repharased sentence: We would have seen The Two Towers if the cinema had been open.

EXAMPLE 3
Please enter the sentence:If we had some matches, we could light a fire.
Repharased sentence: We could light a fire if we had some matches.

2 [8 POINTS] REPHRASING IF SENTENCES II

In the second question, you will write a Java program which takes a sentence in which the main clause precedes the if-clause, and outputs the sentence so that the if-clause precedes the main clause with correct case and punctuation. Basically, you will reverse the operations that you did in the first question.

Green texts are inputs.

EXAMPLE 1
Please enter the sentence:I would have cleaned the house if I'd had time.
Repharased sentence: If I'd had time, I would have cleaned the house.

EXAMPLE 2
Please enter the sentence:We would have seen The Two Towers if the cinema had been open.
Repharased sentence: If the cinema had been open, we would have seen The Two Towers.

EXAMPLE 3
Please enter the sentence:We could light a fire if we had some matches.
Repharased sentence: If we had some matches, we could light a fire.

3 [7 POINTS] COMPUTING DISTANCE IN THREE-DIMENSIONAL SPACE

Mr. Bıdık is curious about computing the distance between two points on three-dimensional Euclidean space. While researching on computing the distance, he came across several distance metrics. Since he just started to elementary school, distance computation is hard for him, especially with respect to some of the metrics. So he wants you (his favorite cousin) to write a Java program which computes the distance between two given points on three-dimensional Euclidean space with respect to the distance metrics below.
Let $p_1 = (x_1, y_1, z_1)$ and $p_2 = (x_2, y_2, z_2)$ be two points on the three-dimensional Euclidean space. The Manhattan distance, the Euclidean distance, and the Cosine distance of p_1 and p_2 is defined respectively, as in the following:

$$ManhattanDistance(p_1, p_2) : |x_1 - x_2| + |y_1 - y_2| + |z_1 - z_2|$$

$$EuclideanDistance(p_1, p_2) : \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$$

$$CosineDistance(p_1, p_2) : 1 - \frac{x_1 * x_2 + y_1 * y_2 + z_1 * z_2}{\sqrt{x_1^2 + y_1^2 + z_1^2} * \sqrt{x_2^2 + y_2^2 + z_2^2}}$$

Your program should take two lines of input. The first line has the information for the coordinates of p_1 and the second line has the information for the coordinates of p_2. Each line consists of three numbers that are the x, y, and z coordinates of the respective point. Note that a coordinate of a point is not necessarily an integer.
Your program can use Math.sqrt() method to calculate the square root of a number and the Math.abs() method to calculate the absolute value of a number. The sqrt and abs are static methods of the Math class (well, indeed all methods of the Math class are static), and thus you do not need to create an object of the Math class to use them. The Math class is in the package java.lang and thus, in order to call these methods, you do not need to import anything.
Two sample runs are given below for your convenience.
EXAMPLE 1
Please enter two points:
4 3 5
3 4 5
Manhattan distance is equal to:2.0
Euclidean distance is equal to:1.4142135623730951
Cosine distance is equal to:0.02000000000000013

EXAMPLE 2
Please enter two points:
6 3 2
2 0 5
Manhattan distance is equal to:10.0
Euclidean distance is equal to:5.830951894845301
Cosine distance is equal to:0.4163860800149799

EXAMPLE 3
Please enter two points:
3 0 -2
11 -2 6
Manhattan distance is equal to:18.0
Euclidean distance is equal to:11.489125293076057
Cosine distance is equal to:0.540976753162627

4 [7 POINTS] UNIFYING TRIBES

Uzumaki and Uchiha were two tribes that lived in the region located at North-East of current Japan in the Heian period (794-1185). After endless wars between these tribes, an era of peace was finally accomplished under the leadership of Uzumaki Nagato and Uchiha Itachi. For them, peace did not only mean the absence of war but meant solid relationship, technological advancement, and new trade opportunities which hopefully lead to prosperity for both tribes. But there was a problem, a huge one.

Even though they spoke the same language, they noticed that they used different systems of measurement which could cause huge problems in trading. Large disputes and disagreements were about to disrupt the long-awaited peace. Both tribes gathered their best mathematicians and asked them to find a solution. After some research, mathematicians noticed that there exists *a linear relationship between all units of measurement*, but the relationship was not the same for each unit. So, they decided that they needed a general solution that can identify the relationship between two units from a few measurements. Both tribes measured 4 objects, which were considered sacred by both tribes, with respect to various properties such as mass, length, volume, etc. You are asked to find a general solution that can convert a measurement by the first tribe to a measurement by the second tribe using 4 samples.

In this task, you will write a Java program that takes 4 observation pairs (same object measured by Uzumaki and Uchiha tribes, respectively), and one additional measurement from the first unit (unit of Uzumaki) as input, and outputs the corresponding measurement in the second unit (unit of Uchiha).
You can check the examples below. Green texts represent the input.

EXAMPLE 1
Please enter 4 observation pairs:
1 2
2 4
5 10
7 14
Please enter the measurement you want to convert:10
Converted measurement is 20.0

EXAMPLE 2
Please enter 4 observation pairs:
5 22
-3 -18
1 2
13 62
Please enter the measurement you want to convert:10
Converted measurement is 47.0

EXAMPLE 3
Please enter 4 observation pairs:
3 2
192 65
21 8
192 65
Please enter the measurement you want to convert:10
Converted measurement is 4.333333333333333