Problem

Consider the following learning set:

1	7	-2	4.5
2	3	-5	2.3
1	6	-2	1.2
2	5	-2	4.5
1	6	-5	2.3

- Each line represents a pattern (form)
- Each column represents a feature

Requirements:

a) Read the learning set from a file saved on your local drive (in.txt) The values on each line will be separated by space. Handle exceptions that may occur

b) Consider that each pattern represents a point. The first feature (column) represents the value of the x coordinate and the second feature represents the value of the y coordinate Calculate and display the Euclidian distances between the first point (pattern – is represented on the first row in the matrix) and the rest of the points.

$$d(A1,A2) = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

Example:

Consider the following features representing the x and y values:

4	5
6	2
6	3
2	4
2	7

The Euclidian distance between the first two patterns is :

$$d(A1,A2) = \sqrt{(4 - 6)^2 + (5 - 2)^2}$$

c) Calculate and display the Mahalanobis distances between the first pattern and the rest of the patterns (use all the features from the learning set).

$$d(\bar{x},\bar{y}) = \left[\sum_{j=1}^{p}(x_j - y_j)^n\right]^{1/n}$$

d) Calculate and display the Cebisev distances between the first pattern and the rest of the patterns (use all the features from the learning set).

$$d(x,y) = \max_{1\le j\le p}|x_j - y_j|$$

e) Calculate and display the City Block distances between the first pattern and the rest of the patterns (use all the features from the learning set).

$$d(x,y) = \sum_{j=1}^{p}|x_j - y_j|$$

Steps & Hints

1. **Create DistanceUtils class**
2. **Use appropriate data structure**
3. **Use Java Streams to quickly iterate and sum elements of collections**

Discussion points:

Java maps & collections

Java Exceptions - hierarchy and handling
https://www.javamex.com/tutorials/exceptions/exceptions_hierarchy.shtml