Q1) Measure the distance between (0, 0, 0) and (1, 1, 1) using the following distance formula. Is the following function a proper distance function? Why? Explain your answer.

Ans) To calculate the distance between two points in Euclidean space, we use the Euclidean distance formula, which is based on the Pythagorean theorem. For example, to find the distance between (0, 0, 0) and (1, 1, 1), we can use the formula d = sqrt((1-0)^2 + (1-0)^2 + (1-0)^2), which simplifies to d = sqrt(3).

On the other hand, the function d(x,y) = Ʃ ((x\_(i- Y\_i )) ^3) is not a proper distance function because it does not satisfy the three conditions required for a distance function. These conditions are:

Non-negativity: d(x,y) should always be non-negative for all x and y. This condition is satisfied since the cube of a real number is always non-negative.

Identity: d(x,y) should only be zero when x is equal to y. However, this condition is not satisfied since d(x,y) can be zero even when x is not equal to y.

Symmetry: d(x,y) should be the same as d(y,x) for all x and y. This condition is also not satisfied since d(x,y) can be different from d(y,x).

Therefore, d(x,y) = Ʃ ((x\_(i- Y\_i )) ^3) is not a proper distance function.