

Today's IIScian Approach

① Let $d_1(x,y) = \sum_{i=1}^n |x_i - y_i|$, $d_2(x,y) = \left(\sum_{i=1}^n |x_i - y_i|^2 \right)^{\frac{1}{2}}$

Then decide which of the following is a metric on \mathbb{R}^n

Ⓐ $d(x,y) = \frac{d_1(x,y) + d_2(x,y)}{1 + d_1(x,y) + d_2(x,y)}$

Ⓑ $d(x,y) = d_1(x,y) - d_2(x,y)$ Ⓒ $d(x,y) = d_1(x,y) + d_2(x,y)$

Ⓓ $d(x,y) = e^{\pi} d_1(x,y) + e^{-\pi} d_2(x,y)$

Solⁿ:-

How to T H I N K

Recall some basic Facts:-

- If d is a metric on X then $\frac{d}{1+d}$ is also a metric on X
- If d_1 and d_2 are metrics on X then $d_1 + d_2$ is also a metric.

• Thus $\frac{d_1 + d_2}{1 + d_1 + d_2}$ is a metric on \mathbb{R}^n

• $a d_1 + b d_2$ is a metric on \mathbb{R}^n if $a > 0, b > 0$

• $d_1 - d_2$ is NOT a metric on \mathbb{R}^n .

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