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**CS 513 MIDTERM**

**Q 1 & 8**

**Ans 1.**

let’s calculate A(**0, 0, 0), B(0, 1, 0), C(0, 1, 1), and D(1, 1, 1)**

d (A, B) = |(0-0)2+ (0-1)2 + (0-0)2|

= 1

d (A, C) = |(0-0)2+ (0-1)2 + (0-1)2|

= 2

d (A, D) = |(0-1)2+ (0-1)2 + (0-1)2|

= 3

d (B, C) = |(0-0)2+ (1-1)2 + (0-1)2|

= 1

d (B, D) = |(0-1)2+ (1-1)2 + (0-1)2|

= 2

d (C, D) = |(0-1)2+ (1-1)2 + (1-1)2|

= 1

There are total 3 properties for valid distance formula.

Property 1: Distance is always non-negative

Property 2: Commutative, distance from “A to B” is distance from “B to A”

Property 3: Triangle inequality holds, distance from “A to C” must be less than or equal to distance from “A to B to C”

All 3 properties are satisfied by the given distance function. Thus, it is a proper distance function.

**Ans 8.**

**a) Estimate the number of Cases in US, Italy & Spain.**

**A.** No of cases in US.

Population of US = 331 million

Cases per million = 381.24

Total number of cases in US = 381.24 \* 331

= 1,26,190.44

No of cases in Italy.

Population of US = 60 million

Cases per million = 1464.97

Total number of cases in Italy = 1464.97 \* 60

= 87,838.2

No of cases in Spain.

Population of Spain = 47 million

Cases per million = 1590.24

Total number of cases in Spain = 1590.24 \* 47

= 74,741.28

**b) Given that a person is living in the US, what is the probability that the person is infected with COVID19.**

p(Infected=yes |Lives=US) =1,26,190.44 / 331000000

= 0.000381

**c) Given that a person is diagnosed with the COVID19, what is the probability that the person lives in the US.**

p(US | Infected= yes) = 1,26,190.44 / 2,87,769.92

= 0.4385