Question 1**: Types of Attributes**

Classify the following attributes as nominal, ordinal, interval, ratio. **Explain why.**

(a) Rating of an Amazon product by a person on a scale of 1 to 5 – Ordinal

Reason being that the ratings have an order but the value 4 might not mean it is twice as good as 2.

(b) The Internet Speed- Ratio

This would be ratio as there is a true 0 indicating no internet and then 40 Mbps would be twice as fast as 20 Mbps.

(c) Number of customers in a store- ratio

There is a true 0 indicating no customers in the store and then 40 customers is twice as many customers as 20.

(d) UCF Student ID- Nominal

They maybe numeric but do not have any arithmetic value associated with them or an order

(e) Distance- Ratio

It is possible to have a distance of 0 and that would indicate there is no distance between the 2 points and 40 miles would be twice as far as 20 miles

(f) Letter grade (A, B, C, D)-Ordinal

The grades have an order D>C>B>A but the difference between A and B might not be the same as the difference between C and D

(g) The temperature at Orlando- Interval

As in scales like Fahrenheit and Celsius do not view 0 as no temperature so comparing based on ratios would not be correct, differences are meaningful. Kelvin however is a ratio since it has a absolute zero.

Question 3 : **Distance/Similarity Measures**

Grouping by length – width ratio (Taking the longer side as the length and shorter as width)

2,1 = 2/1 = 2

1,1 = 1/1 = 1

6,3 = 6/3 = 2

3,3 = 3/3 = 1

So based on the results above:

2,1 and 6,3 are similar (group A)

1,1 and 3,3 are similar (group B)

Grouping based on Euclidean distance:

Using the formula for Euclidean distance

2,1 v 1,1 – 1.0 C

2,1 v 6,3 – 4.47 B

2,1 v 3,3 – 2.24 A

1,1 v 6,3 – 5.39 B

1,1 v 3,3 – 2.83 A

6,3 v 3,3 – 3.0 A

Grouping them based on the calculated distance between a group not being more that 1.0

So we have 3 in A, 2 in B and 1 in C, the grouping is based on the size difference between the shapes being compared.

Which proximity measure would you use to group the boxes based on their shapes (length-width ratio)?

Length – Width ratio

Which proximity measure would you use to group the boxes based on their size?

Euclidean distance