MM217 : Data Analysis and Interpretation

Week 1: Assignment

For discussion during Week 3

1. Serological survey was carried out in Mumbai for COVID 19 in three wards. Randomly selected persons were tested from these three wards. However, it was voluntary. Survey noted that the response was not good from persons from non-slum areas, while from the slum area persons were more responsive. Total 6939 persons surveyed. And survey showed that 57% seroprevalence in the slum area and 16% seroprevalence in the non-slum areas. Mumbai has total population of 1.8 crore.
    a. What is the population here?
    b. Do you think the results are good enough to infer about situation in Mumbai? Why? How?
    c. If answer to question 2 is yes, then can it be further expanded to Maharashtra?
    d. If answer to question is yes, then can it be applied to any industrial city in India? Why?
    e. It is known that approximately 40% of those surveyed were infected by Covid but recovered. So how many in Mumbai might have been infected but remained asymptomatic? Comment on how good is your answer.

2. You hear the weather forecast in the morning that there is 60% chance of rain, what will you understand? (select all the correct answers)
    a. Under similar condition in the past 60% of the days it rained
    b. It will rain only 60% of the time in the day
    c. In the past 100 days 60 days it rained and had similar conditions
    d. 40% of the time in the day it will not rain.
    e. In the recorded history of the rain, under similar weather conditions, it rained approximately 60% of the time.
    f. It's good to take an umbrella as it will most likely rain today.

    Discuss your reasons in one line for the correct answer that you choose.

3. The following table (next page) gives the variation of density and lattice parameter with composition in SiGe alloys.
    a. Describe the data in the best way you can.
    b. Describe if there are any relationship between the three colums.
    c. One of the Density value is missing. Can you judge what that could have been?
    d. Do you think you answer to (a) above will change after answer to (c)?
    e. This data represents which population?

Mol%Si	LatPara	Density
100	5.434	2.328
87.4	5.454	2.72
85.8	5.461	2.8
75.7	5.473	3.03
57.5	5.518	3.62
44.3	5.549	3.95
22.9	5.593	4.7
15	5.62	4.86
13.5	5.613	4.89
12.6	5.626	–
0	5.657	5.323

4. Following data gives the variation of specific heat with temperature in copper in the low temperature regime (0 – 20K).

temp	SpecHeat
1.00	0.000743
2.00	0.00177
3.00	0.00337
4.00	0.00582
5.00	0.00943
6.00	0.0145
7.00	0.0213
8.00	0.0301
9.00	0.0414
10.00	0.0555
12.00	0.0936
14.00	0.149
16.00	0.225
18.00	0.328
20.00	0.462

   a. What is correlation between the temp (K) and the specific heat?
   b. Plot the temp vs specific heat and comment on your answer to a.

5. Refer to the enclosed pdf of Consumer Price Index (CPI) prepared by RBI for the year 2020. CPI is defined as “A comprehensive measure used for estimation of price changes in a basket of goods and services representative of consumption expenditure in an economy is called consumer price index.”
   a. How will you show the relationship between rural and urban indices?
   b. How will you answer if inflation is raising or not?
   c. Describe the data in five statements.

(P.T.O)

6. The variation of linear thermal expanion with temperature in BN in the temperature regime (77 – 1289 K) is given in the following table:

Temp (K)	LinearthermExp
77	-0.38±0.05
200	- 0.28±0.05
535	+0.44±0.14
668	+0.86±0.14
785	+1.458±0.14
889	+2.02±0.14
1008	+2.66±0.14
1061	+2.96± 0.14
1137	+3.60±0.14
1205	+3.90±0.14
1289	+4.40±0.14

   a. Explain the presentation of Linear Thermal Expansion values given in the table.
   b. What are the significant digits in data on temperature and that of linear thermal expansion values?
   c. Find correlation between the temperature and the linear thermal expansion value.