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Essential Mathematical Theories.

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ABSTRACT:

This paper contains some very important mathematical theories belonging to very basic and applied mathematics. Concepts such as Arithmetic Progression, Percentage and Statistics are used in this paper. This paper states that how an Arithmetic Progression with decreasing common difference is related with Fractions and a continuous unit addition in them. This paper also explains that how can a data with some values same be represented using statistics.

The Theory of Distinctive Fractions

What is Arithmetic Progression?

And: The sequence of numbers having constant common difference is called as Arithmetic Progression.

According to this theory, if we increase a same number to the numerator and denominator of a fraction, then the fraction with increased number shows more value of percentage. Both the percentage have some difference, the difference is directly proportional to the value of increased number.

$$\frac{2}{5} < \frac{2+1}{5+1}$$

$$\frac{2}{5} < \frac{3}{6} = \frac{1}{2}$$

$$40\% < 50\%$$

Difference = 10%

$$\frac{2}{5} < \frac{2+5}{5+5}$$

$$\frac{2}{5} < \frac{7}{10}$$

$$40\% < 70\%$$

Difference = 30%

If we take two such fractions and then start adding by a unit of 1, then their percentage differences will be in an Arithmetic Progression with decreasing common difference. For example: let us take the first fraction as 1/100 and let's add 25 to both the numerator and denominator in the second fraction: $\frac{1+25}{100+25}$

$$\frac{1}{100} \times 100 = 1, \frac{26}{125} \times 100 = 20.8$$

20.8 – 1 = 19.8

Now, adding 1 in both the numerators.

$$\frac{2}{100} \times 100 = 2, \frac{27}{125} \times 100 = 21.6$$

21.6 – 2 = 19.6

$$\frac{3}{100} \times 100 = 3, \frac{28}{125} \times 100 = 22.4$$

22.4 – 3 = 19.4

$$\frac{4}{100} \times 100 = 4, \frac{29}{125} \times 100 = 23.2$$

23.2 – 4 = 19.2

$$\frac{5}{100} \times 100 = 5, \frac{30}{125} \times 100 = 24$$

24 – 5 = 19

Here 19.8, 19.6, 19.4, 19.2 and 19 form an Arithmetic Progression of decreasing common difference. We can say that the Fractional Addition of this A.P. is 25. 25 can be called as the Fractional Addition of this A.P.

We can find out the Fractional Addition of any A.P. with decreasing common difference. For example: Let us consider the A.P. 19.8, 19.6, 19.4, 19.2 and 19.

Step1: Select any term of this A.P. Here, let's select the 3^{rd} term (19.4)

Step2: write it as: ____ - term number = term.

For example: ____ - 3 = 19.4

22.4 – 3 = 19.4

Now, we can write (22.4 – 3) in place of 19.4

Here, 22.4 can be written as $\frac{28}{125} \times 100$

And 3 can be written as $\frac{3}{100} \times 100$

$$19.4$$

$$(22.4 - 3)$$

$$\left[\frac{28}{125} \times 100 - \frac{3}{100} \times 100\right]$$

$$\left[\frac{3+25}{100+25} \times 100 - \frac{3}{100} \times 100\right]$$

Thus, the Fractional Addition of this Arithmetic Progression with common difference - 0.2 is 25.

Now, Let us consider another A.P. : 33, 32.66, 32.33, 32, 31.66

Let's select the fourth term.

$$32$$

$$(36 - 4)$$

$$\left[\frac{54}{150} \times 100 - \frac{4}{100} \times 100\right]$$

$$\left[\frac{4+50}{100+50} \times 100 - \frac{4}{100} \times 100\right]$$

Thus, the Fractional Addition of this Arithmetic Progression with decreasing common difference 0.33 is 50.

Now, Let us consider another A.P. : 49.5, 49, 48.5, 48, 47.5

Let's select the first term.

$$49.5$$

$$(50.5 - 1)$$

$$\left[\frac{101}{200} \times 100 - \frac{1}{100} \times 100\right]$$

$$\left[\frac{1+100}{100+100} \times 100 - \frac{1}{100} \times 100\right]$$

Thus, the Fractional Addition of this Arithmetic Progression with decreasing common difference 0.5 is 100.

The Theory of Continued Frequency.

This Theory is used to convert the data presented in a tabular format into a simplified way and hence makes it easy to find the values (given in the data). Here, the values should be in an continuous way for example: 5 after 4 and not 6 after 4. The values should be in an increasing order. Now, let's see how the data is simplified.

Sr. No.	Value
1	1.01
2	1.01
3	1.01
4	1.01
5	1.01 (5)
6	1.02
7	1.02
8	1.02
9	1.02 (4)
10	1.03
11	1.03
12	1.03
13	1.03 (4)
14	1.04
15	1.04
16	1.04 (3)
17	1.05
18	1.05
19	1.05 (3)
20	1.06
21	1.06 (2)
22	1.07
23	1.07 (2)
24	1.08
25	1.08 (2)
26	1.09
27	1.09 (2)
28	1.10
29	1.10 (2)
30	1.11
31	1.11 (2)
32	1.12 (1)
33	1.13
34	1.13 (2)
35	1.14 (1)
36	1.15 (1)
37	1.16 (1)
38	1.17
39	1.17 (2)
41	1.18 (1)
42	1.19 (1)
43	1.20 (1)
44	1.21 (1)
45	1.22 (1)
46	1.23 (1)

In the above table, If the value occurs more that ones then their frequency (of occurrence) is represented in that row in (brackets), for example: The value 1.01 has occurred 5 times so, (5) is represented below in that row. Similarly all the frequencies are represented in their respective rows.

After critical observation you may notice that-

Frequency (5) has occurred ones.

Frequency (4) has occurred twice one after the other.(in 1.02 and 1.03)

Frequency (3) has occurred twice one after the other.

Frequency (2) has occurred six times one after the other.

Then Frequency (1) has occurred ones.

Frequency (2) has occurred ones.

Frequency (1) has occurred 3 times

Then again Frequency (2) has occurred ones.

At the last Frequency (1) has occurred six times.

Frequency	5	4	3	2	1	2	1	2	1
Multiply	×	×	×	×	×	×	×	×	×
Occurrence of Frequencies.	1	2	2	6	1	1	3	1	6
Product.	5	8	6	12	1	2	3	2	6

Now, let us learn how to find the values of random Sr. Numbers.

Let us suppose that we have to calculate the value of Sr. Number 35, then sum up the numbers in the Product row till 35 means 5 + 8 + 6 + 12 + 1 + 2 + 1 of 3 = 35. Now sum up the digits in the upper row (Occurrence of Frequencies) till that digit i.e. 1 + 2 + 2 + 6 + 1 + 1 + 1 of 3 = 14 which means 1.14

So, the value of Sr. Number 35 will be 1.14

Let us suppose that we have to calculate the value of Sr. Number 11, then sum up the numbers in the Product row till 11 means 5 + 6 of 8 = 11. Now, compare 6 with the upper Frequency row in that same column, there is 4. Here 6 is greater than 4 so, you can take the value 2 (of Occurrence of Frequencies) in the row below (same column). Then it will be 1 + 2 = 3

Thus, the value of Sr. Number 11 will be 1.03. If you had to find the value of Sr. Number 8, then sum of the numbers is the Product row till 8 would be 5 + 3 of 8 .Now, 3 is smaller than 4 so, you have to substrate 1 from 2 which is 2 – 1 = 1 and 1 + (2 – 1) = 1 + 1 = 2.

Thus, the value of Sr. Number 8 will be 1.02

Let us suppose that we have to calculate the value of Sr. Number 29, then sum up the numbers in the Product row till 29 means 5 + 8 + 6 + 10 of 12 = 29. Now compare 10 with 2, here 10 is very big than 2 so do $\frac{10}{2} = 5$ Now, we have to take 5 out of 6 from the row below. (Occurrence of Frequencies) (same column)

The sum of Occurrence of Frequencies will be 1 + 2 + 2 + 5 of 6 = 10

Thus, the value of Sr. Number 29 will be 1.10

In the 1st case where we found the value of Sr. Number 35, we didn't compare 1 of 3 means 1 with the frequency because the frequency was 1. In such cases we don't compare with frequency but compare with Occurrence of Frequencies and solve as we did in the 1st case.

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