**ICDS Benefits Statistical Analysis (Statistics)**

**INTRODUCTION:**

We collected these data from ICDS (Integrated Child Development Service) which is a scheme launched in 1975 by the Tamil Nadu Government, to increase the health, nutrition and education. The main purpose of the scheme is to provide food for the poor child.

These are the data of monthly expenditure of vegetables, grocery and also, they provide the health mix powder based on their ages. The average amount spent for one person in the pre-school.

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**Newton Forward Interpolation**

1.The monthly expenditure of vegetables for the students at the preschool in 2022. The data is for January, March, May, July, September, November. Find the average amount spent in February. [x=2]

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **x** | 1 | 3 | 5 | 7 | 9 | 11 |
| **y** | 590.46 | 455.24 | 397.86 | 666.23 | 669.50 | 590.23 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **X** | **y** | **△y** | **△2 y** | **△3** y | **△4 y** | **△5 y** |
| **1**  (x0) | **590.46**  (y0) |  |  |  |  |  |
|  |  | **-135.22**  (△y0) |  |  |  |  |
| 3 | 455.24 |  | **77.84**  (△2 y0) |  |  |  |
|  |  | -57.38 |  | **247.91**  (△3 y0) |  |  |
| 5 | 397.86 |  | 325.75 |  | **-838.76**  (△4 y0) |  |
|  |  | 268.37 |  | -590.85 |  | **1612.17**  (△5 y0) |
| 7 | 666.23 |  | -265.10 |  | 773.41 |  |
|  |  | 3.27 |  | 182.56 |  |  |
| 9 | 669.50 |  | -82.54 |  |  |  |
|  |  | -79.27 |  |  |  |  |
| 11 | 590.23 |  |  |  |  |  |

y(3) = 590.46 + (0.5)(-135.22) + (77.84) + (247.91) +

(-838.76) + (1612.76)

= 590.46 + (- 67.61) + (-9.73) + 152.494375 + 32.7640625 + 44.08277344

y(3) = 605.46

**The average amount that spent for February month is 605.46**

**Newton Backward Interpolation**

2.The monthly expenditure of Groceries for the students at the preschool in 2022. The data is for February, April, June, august, October, December. Find the average amount spent in November. [x=11]

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **x** | 2 | 4 | 6 | 8 | 10 | 12 |
| **y** | 221.50 | 246.23 | 123.33 | 191.50 | 222.60 | 226.21 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **X** | **y** | **▽y** | **▽2 y** | **▽3 y** | **▽4 y** | **▽5 y** |
| 2 | 221.50 |  |  |  |  |  |
|  |  | 24.73 |  |  |  |  |
| 4 | 246.23 |  | -147.63 |  |  |  |
|  |  | -122.90 |  | 338.70 |  |  |
| 6 | 123.23 |  | 199.07 |  | -566.84 |  |
|  |  | 68.17 |  | -228.14 |  | **804.56**  (△5 y0) |
| 8 | 191.50 |  | -37.07 |  | **237.72**  (△4 y0) |  |
|  |  | 31.1 |  | **9.58**  (△3 y0) |  |  |
| 10 | 222.60 |  | **-27.49**  (△2 y0) |  |  |  |
|  |  | **3.61**  (△y0) |  |  |  |  |
| **12**  (x0) | **226.21**  (y0) |  |  |  |  |  |

y(11) = 226.21 + (- 0.5)(3.61) + (-27.49) +

(9.58) (237.72) +

(804.56)

= 226.21 + (- 1.805) + 3.4362 + (- 0.5988) + (-9.2859) + (-21.9997)

y(11) = 195.95

**The average amount that spent for November month is 195.95**

**Newton Divided Difference (or) Lagrange’s Method**

3.The monthly expenditure of vegetables for the students at the preschool in 2022. The data is for January, March, May, July, September, November. Find the average amount spent in February. [x=2]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | 2 | 6 | 18 | 22 |
| y | 165 | 142 | 125 | 50 |

**Newton Divided Difference:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **x** | **y** | **First order** | **Second order** | **Third order** |
| **2**  **(x0)** | **165**  **(y0)** |  |  |  |
|  |  | **-5.75**  **(x0 ,x1)** |  |  |
| 4  (x1) | 142  (y1) |  | **0.2708**  **(x0 ,x1 ,x2)** |  |
|  |  | -1.4167  (x1 ,x2) |  | **-0.0677**  **(x0 ,x1 ,x2 ,x3)** |
| 18  (x2) | 125  (y2) |  | -1.0883  (x1 ,x2 ,x3) |  |
|  |  | -18.75  (x2 ,x3) |  |  |
| 22  (x3) | 50  (y3) |  |  |  |

**f(x) = y0 + (x- x0 )f(x0 ,x1) + (x- x0 ) (x1- x2)f(x0 ,x1 ,x2)**

**+ (x- x0 ) (x1- x2) (x2- x3)f(x0 ,x1 ,x2 ,x3)**

f(12) = 165 + (12- 2)f(-5.75) + (12-2) (12-6)f(0.2708)

+ (12-2) (12-6) (12-18)f(-0.0677)

= 165 + (-57.5) + 16.248 + 24.372

|  |
| --- |
| f(12) = 148.12 |

**Lagrange’s Method :**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X | 2 | 6 | 18 | 22 |
| Y | 165 | 142 | 125 | 50 |

f(12) = 146.125

**conclusion:**

The detail analysis of this data is every children is getting equal benefit and average expenditure is almost same to one another .The experimental analysis is help to find out the future month expenditure. Applying oriented numerial methods in the real life.