Lab. Meteorological Statistics ........ Fourth stage

(First Semester)

Department of Atmospheric Sciences

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***C- The standard deviation***

The standard deviation of a set of N values ,, is denoted ( S )

1. **Calculation the Standard deviation for unclassified data:**

**SD =**

***For example***\\ calculate the standard deviation of the following data?

 **( 2,3.5,4,4.5,5)**

|  |  |  |
| --- | --- | --- |
|  |  |  |
| 3 | 3-4=-1 | 1 |
| 3.5 | 3.5-4= -0.5 | 0.25 |
| 4 | (4-4) = 0 | 0 |
| 4.5 | (4.5-4 )= 0.5 | 0.25 |
| 5 | (5-4)= 1 | 1 |
|  |  |  |

SD = =

**H.W \\ find the standard deviation from the following data :**

**( 2,8,3,7,6,4)**

**2-Calculation the standard deviation of the classified data:**

The standard deviation some times called root mean square deviation ( Rms ) if ,, is mid point of classes and ,, is frequency the standard deviation can be by :

**SD =**

***For example***\\ calculate The Standerd deviation of the following data?

|  |  |  |  |
| --- | --- | --- | --- |
| **Class** |  |  |  |
| 15-19 | 3 | 17 | 51 |
| 20-24 | 5 | 22 | 110 |
| 25-29 | 7 | 27 | 189 |
| 30-34 | 15 | 32 | 480 |
| 35-39 | 10 | 37 | 370 |
| 40-44 | 6 | 42 | 252 |
| 45-49 | 4 | 47 | 188 |
|  |  =50 |  | =1640 |

 **= 32.8** SD =

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Class** |  |  |  |  |  |  |
| 15-19 | 3 | 17 | 51 | -15.8 | 249.64 | 748. 92 |
| 20-24 | 5 | 22 | 110 | -10.8 | 116.64 | 583.2 |
| 25-29 | 7 | 27 | 189 | -5.8 | 33.64 | 235.48 |
| 30-34 | 15 | 32 | 480 | -0.8 | 0.64 | 9.6 |
| 35-39 | 10 | 37 | 370 | 4.2 | 17.64 | 176.4 |
| 40-44 | 6 | 42 | 252 | 9.2 | 84.64 | 507.8 |
| 45-49 | 4 | 47 | 188 | 14.2 | 201.64 | 806.56 |
|  | =50 |  | =1640 |  |  | =3068 |

SD = = = 7.83

***D-The***  (: The variance depends on the dispersion and the divergence of the data from its mean, so the variance is large if the data is divergent from its mean and vice versa.

**1-Calculation the variance for unclassified data:**

**= - = -**

***For example***\\ calculate the variance deviation of the following data?

|  |  |
| --- | --- |
|  |  |
| 3 | 9 |
| 3.5 | 12.25 |
| 4 | 16 |
| 4.5 | 20.25 |
| 5 | 25 |
| 20 |  82.5 |

  **= -**

**= – 16** =**0.5**

**NOTS:** the standard deviation can be extracted by the second method.

1. **the standard deviation=**

**SD = SD =**

***For example***\\ S.D.= = 0.707 **whereas**: *=* 0.707\*0.707= 0.5

1. **Standard Deviation = SQRT (Variance )**

SD = SQRT (0.5)

2- **Calculation the variance for classified data:**

 **= -**

***For example***\\ calculate the variance deviation of the following data?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| 15-19 | 3 | 17 | 51 | 289 | 867 |
| 20-24 | 5 | 22 | 110 | 484 | 2420 |
| 25-29 | 7 | 27 | 189 | 729 | 5103 |
| 30-34 | 15 | 32 | 480 | 1024 | 15360 |
| 35-39 | 10 | 37 | 370 | 1369 | 13640 |
| 40-44 | 6 | 42 | 252 | 1764 | 10584 |
| 45-49 | 4 | 47 | 188 | 2209 | 8836 |
|  |  = 50 |  | 1640 |  | =56860 |

**= = = 32.8** =32.8\*32.8=1075.84

 **= - = =61.36**

2- S = S = = 7.833

  **= =61.36**

**H.W \\ find The Standerd deviation and the variance of the following data**

|  |  |  |
| --- | --- | --- |
| **Classes** |  |  |
| 2-4 | 2 | 3  |
| 4-6 | 3 | 5 |
| 6-8 | 6 | 7 |
| 8-10 | 2 | 9 |
| 10-12 | 1 | 11 |
|  | =14  |  |