PRACTICAL NUMBER: 5

**Measures of dispersion (Variance, standard deviation, mean deviation, range, minimum, maximum, coefficient of variation)**

**FORMULA USED:**

1. **RANGE**

Range =

1. **MEAN DEVIATION**
2. Ungrouped

MD=

1. Grouped

MD=

1. **MODE DEVIATION**
2. Ungrouped

MD=

1. Grouped

MD=

1. **MEDIAN DEVIATION**
2. Ungrouped

MD=

1. Grouped

MD=

1. **STANDARD DEVIATION**
2. Ungrouped

σ=

1. Grouped

σ=

1. **VARIANCE**
2. Ungrouped

=

1. Grouped

=

**Question 1**: Find the min, max, range, mean, median, mode (by both empirical and observation), deviation with respect to mean, median, mode and standard deviation as well as variance of the given data:

100, 105, 110, 105, 115, 110, 115, 105, 100, 114, 116, 118, 119, 120, 115, 116, 117, 117, 119, 115

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X | Xi-M | Xi-MEDIAN | Xi-MODE | (Xi-M)^2 |
| 100 | 12.55 | 15 | 15 | 157.5025 |
| 100 | 12.55 | 15 | 15 | 157.5025 |
| 105 | 7.55 | 10 | 10 | 57.0025 |
| 105 | 7.55 | 10 | 10 | 57.0025 |
| 105 | 7.55 | 10 | 10 | 57.0025 |
| 110 | 2.55 | 5 | 5 | 6.5025 |
| 110 | 2.55 | 5 | 5 | 6.5025 |
| 114 | 1.45 | 1 | 1 | 2.1025 |
| 115 | 2.45 | 0 | 0 | 6.0025 |
| 115 | 2.45 | 0 | 0 | 6.0025 |
| 115 | 2.45 | 0 | 0 | 6.0025 |
| 115 | 2.45 | 0 | 0 | 6.0025 |
| 116 | 3.45 | 1 | 1 | 11.9025 |
| 116 | 3.45 | 1 | 1 | 11.9025 |
| 117 | 4.45 | 2 | 2 | 19.8025 |
| 117 | 4.45 | 2 | 2 | 19.8025 |
| 118 | 5.45 | 3 | 3 | 29.7025 |
| 119 | 6.45 | 4 | 4 | 41.6025 |
| 119 | 6.45 | 4 | 4 | 41.6025 |
| 120 | 7.45 | 5 | 5 | 55.5025 |
| 2251 | 105.7 | 93 | 93 | 756.95 |

|  |  |  |
| --- | --- | --- |
|  | By Formulas | By Excel Functions |
| **MIN=** | 100 | 100 |
| **MAX=** | 120 | 120 |
| **RANGE=** | 20 |  |
| **MEAN=** | 112.55 | 112.55 |
| **N/2=** | 10 |  |
| **MEDIAN=** | 115 | 115 |
| **MODE=** | 115 | 115 |
| **MODE BY EMPIRICAL=** | 119.9 |  |
| **MEAN DEVIATION=** | 5.285 | 5.285 |
| **MEDIAN DEVIATION=** | 4.65 |  |
| **MODE DEVIATION=** | 4.65 |  |
| **STANDARD DEVIATION=** | 6.152032 | 6.311852 |
| **VARIANCE =** | 37.8475 | 39.83947 |

**Question 2:** For the given continuous data find the mean standard deviation and variance:

|  |  |
| --- | --- |
| AGE(X) | F |
| 20-30 | 3 |
| 30-40 | 61 |
| 40-50 | 132 |
| 50-60 | 153 |
| 60-70 | 140 |
| 70-80 | 51 |
| 80-90 | 2 |

Ans:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| AGE(X) | F | Xi | Di | di/H | fi di | di^2 | fi di^2 |
| 20-30 | 3 | 25 | -30 | -3 | -9 | 9 | 27 |
| 30-40 | 61 | 35 | -20 | -2 | -122 | 4 | 244 |
| 40-50 | 132 | 45 | -10 | -1 | -132 | 1 | 132 |
| 50-60 | 153 | 55 | 0 | 0 | 0 | 0 | 0 |
| 60-70 | 140 | 65 | 10 | 1 | 140 | 1 | 140 |
| 70-80 | 51 | 75 | 20 | 2 | 102 | 4 | 204 |
| 80-90 | 2 | 85 | 30 | 3 | 6 | 9 | 18 |
|  | 542 |  |  |  | -15 |  | 765 |

Let us assume the mean A to be 55 and h(height of the interval ) is known to be 10

|  |  |  |  |
| --- | --- | --- | --- |
| **MEAN=** | 54.72325 | | |
| **VARIANCE=** | | 141.0673 | |
| **STANDARD DEVIATION=** | | | 11.87718 |