MATHEDA: ENGINEERING DATA ANALYSIS

*“Jaguar and Panther Performance Data”*

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**Introduction:**

This report aims to provide a comprehensive descriptive statistical analysis of the recent performance data for two key machines, Jaguar and Panther, used in producing 1K ohm resistors. The insights derived will help identify any significant variations in performance and guide necessary improvements. All calculations include both statistical software outputs and manual computations for validation. The objective is to evaluate the consistency of their performance and identify any significant variations that may require attention. Key statistical metrics analyzed include:

* Mean
* Median
* Mode
* Range
* Variance
* Standard Deviation
* Coefficient of Variation

To ensure accuracy, the analysis incorporates both manual calculations and software-generated results. Visualizations such as boxplots are also included to provide a clear representation of data distribution and highlight potential outliers. These insights aim to guide necessary improvements and ensure optimal machine performance.

# Data Summary:

# These visual aids provide a clearer comparison of the two machines, allowing for the identification of any inconsistencies or anomalies in their performance, which may point to operational inefficiencies or external factors impacting their output.

# Jaguar Performance data:

|  |  |  |
| --- | --- | --- |
| Lot\_No | Jaguar | Panther |
| 1 | 997 | 1035 |
| 2 | 1153 | 975 |
| 3 | 920 | 982 |
| 4 | 1074 | 1038 |
| 5 | 1013 | 891 |
| 6 | 960 | 907 |
| 7 | 890 | 960 |
| 8 | 910 | 978 |
| 9 | 944 | 1041 |
| 10 | 1065 | 1026 |
| 11 | 1083 | 590 |
| 12 | 1820 | 990 |
| 13 | 859 | 1076 |
| 14 | 1043 | 1092 |
| 15 | 1710 | 1026 |
| 16 | 933 | 935 |
| 17 | 790 | 1710 |
| 18 | 999 | 946 |
| 19 | 1028 | 1073 |
| 20 | 976 | 986 |
| 21 | 1015 | 1078 |
| 22 | 932 | 969 |
| 23 | 957 | 1083 |
| 24 | 936 | 790 |
| 25 | 977 | 1007 |
| 26 | 1037 | 934 |
| 27 | 997 | 999 |
| 28 | 1730 | 1011 |
| 29 | 1046 | 942 |
| 30 | 1840 | 1090 |

## Statistics:

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### JAGUAR PERFORMANCE DATA PANTHER PERFORMANCE DATA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | MEAN | 1087.80 | | MEDIAN | 998.0 | | MODE | 997 | | RANGE | 1050 | | STANDARD DEVIATION | 284.2 | | VARIANCE | 80749.82068965517 | | COEFFICIENT OF VARIATION | 0.26 | | |  |  | | --- | --- | | MEAN | 1005.3333333333334 | | MEDIAN | 994.5 | | MODE | 1026 | | RANGE | 1120 | | STANDARD DEVIATION | 166.3 | | VARIANCE | 27642.850574712647 | | COEFFICIENT OF VARIATION | 0.17 | |

|  |  |  |
| --- | --- | --- |
| Manual Calculations: | Jaguar | Panther |
| Mean |  |  |
| Median | 790, 859, 890, 910, 920, …,  1820, 1840  Middle values: 997 and 999 | 590, 891, 907, 935, 942, …, 1078,1090  Middle values: 990 and 999 |
| Mode | 927 | 1026 |
| Range |  |  |
| Variance |  |  |
| Standard Deviation |  |  |
| Coefficient of Variation |  |  |

### Final Observations / Hypotheses:

**Central Tendency (Mean, Median, Mode):**

* **Hypothesis 1**: The mean performance of Jaguar is higher than Panther.
* **Hypothesis 2**: The median values for both Jaguar and Panther are relatively close, suggesting a similar central tendency.
* **Hypothesis 3**: The mode of Jaguar is lower than that of Panther, indicating differences in the most frequently occurring value.

**Spread and Variability (Range, Standard Deviation, Variance):**

* **Hypothesis 4**: Jaguar has a greater range of values compared to Panther, indicating more variability in performance.
* **Hypothesis 5**: The standard deviation and variance for Jaguar are significantly higher than those of Panther, suggesting Jaguar data is more dispersed.

**Coefficient of Variation (CV):**

* **Hypothesis 6**: Panther data is more consistent, as shown by its lower coefficient of variation (CV = 0.17) compared to Jaguar (CV = 0.26).

**Outliers (Box Plot):**

* **Hypothesis 7**: Both Jaguar and Panther datasets have outliers, but the impact of outliers may be more pronounced in the Jaguar dataset due to its higher range and variance