

Homework 1

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1. The following measurements were recorded for the drying time, in hours, of a certain brand of latex paint.

3.4 2.5 4.8 2.9 3.6
2.8 3.3 5.6 3.7 2.8
4.4 4.0 5.2 3.0 4.8

Assume that the measurements are a simple random sample.

- (a) What is the sample size for the above sample?

Solution:

The sample size is 15, since there are 15 elements.

- (b) Calculate the sample mean, median, sample variance and sample standard deviation.

Solution:

- (1) mean:

$$\frac{3.4 + 2.5 + 4.8 + 2.9 + 3.6 + 2.8 + 3.3 + 5.2 + 3.7 + 2.8 + 4.4 + 4.0 + 5.2 + 3.0 + 4.8}{15} = 3.787$$

- (2) median: When sorted, the set has a middle value of 3.6.

(3) variance:

Variance (for a discrete data set) is defined as:

$$\sigma^2 = \sum \frac{(x_i - \bar{x})^2}{n - 1}$$

Written out for this set, the variance is

$$\begin{aligned} & (3.4 - 3.787)^2 + (2.5 - 3.787)^2 + (4.8 - 3.787)^2 \\ & + (2.9 - 3.787)^2 + (3.6 - 3.787)^2 + (3.3 - 3.787)^2 \\ & + (5.2 - 3.787)^2 + (3.7 - 3.787)^2 + (2.8 - 3.787)^2 \\ & + (4.4 - 3.787)^2 + (4.0 - 3.787)^2 + (5.2 - 3.787)^2 \\ & \quad + (3.0 - 3.787)^2 + (4.8 - 3.787)^2 \end{aligned} = \frac{13.16 \dots}{14} = 0.94$$

(4) standard deviation:

The standard deviation is the square root of the variance which equals 0.97.

(c) Compute the 20% trimmed mean for the above data set.

Solution:

The 20% trimmed mean is the mean of the dataset after trimming 20% of the data points off of each end of the sorted dataset. Because the dataset is 14 elements in size, the 3 smallest and greatest values should be dropped:

3.0, 3.3, 3.4, 3.6, 3.7, 4.0, 4.4

14. A tire manufacturer wants to determine the inner diameter of a certain grade of tire. Ideally, the diameter would be 570 mm. The data are as follows:

572, 572, 573, 568, 569, 575, 565, 570.

- (a) Find the sample mean and median. (I used my calculator)

Solution:

- (1) Mean: 570.5
- (2) Median: 571

- (b) Find the sample variance, standard deviation, and range.

Solution:

- (1) Variance: 8.75
- (2) Stdev: 2.95
- (3) Range: 10

- (c) Using the calculated statistics in parts (a) and (b), can you comment on the quality of the tires?

Solution:

The given the mean and standard deviation, there are 6 tires within 1 standard deviation, and all tires are within 3 standard deviations, meaning there are no significant outliers from this set of tires.

21. The lengths of power failures, in minutes, are recorded in the following table.

22	18	135	15	90	78	69	98	102
83	55	28	121	120	13	22	124	112
70	66	74	89	103	24	21	112	21
40	98	87	132	115	21	28	43	37
50	96	118	158	74	78	83	93	95

- (a) Find the sample mean and sample standard deviation using TI-83/84 calculator.

Solution:

- (1) Mean: 74.02
(2) Standard Deviation: 31.82

- (b) Find the five number summary using TI-83/84 calculator built-in function.

Solution:

A five-number summary includes the minimum, Q1, the median, Q3, and the maximum. For this dataset, this is:

$$\{13, 32.5, 78, 102.5, 158\}$$

22. The following data are the measures of the diameters of 36 rivet heads in 1/100 of an inch.

6.72	6.77	6.82	6.70	6.78	6.70	6.62	6.75
6.66	6.66	6.64	6.76	6.73	6.80	6.72	6.76
6.76	6.68	6.66	6.62	6.72	6.76	6.70	6.78
6.76	6.67	6.70	6.72	6.74	6.81	6.79	6.78
6.66	6.76	6.76	6.72				

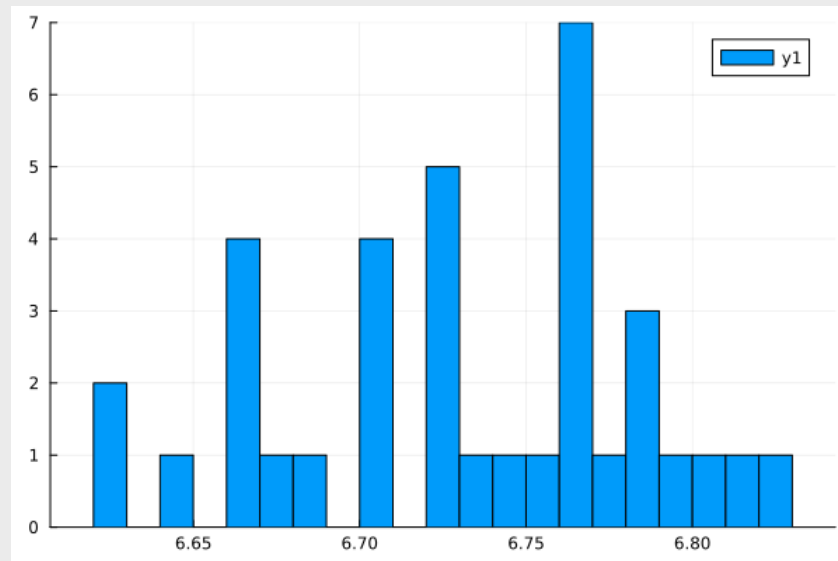
- (a) Calculate the sample mean, median, sample variance and sample standard deviation.

Solution:

- (1) Mean: 6.726
(2) Median: 6.725
(3) Sample Variance: 0.002870
(4) Stdev: 0.05357

(b) Construct a relative frequency histogram of the data.

Solution:



- (c) The following are historical data on staff salaries (dollars per pupil) for 30 schools sampled in the eastern part of the United States in the early 1970s.

3.79	2.99	2.77	2.91	3.10	1.84	2.52	3.22
2.45	2.14	2.67	2.52	2.71	2.75	3.57	3.85
3.36	2.05	2.89	2.83	3.13	2.44	2.10	3.71
3.14	3.54	2.37	2.68	3.51	3.37		

- (a) Find the sample mean and sample standard deviation using TI-83/84 calculator built-in function.

Solution:

- (1) Mean: 2.897
(2) Stdev: 0.5415

- (b) Find the five number summary using TI-83/84 calculator built-in function.

Solution:

$\{1.84, 2.52, 2.86, 3.325, 3.85\}$