
Notes 10.3 – Statistics and Data - Numeric

I. Vocabulary

- A.) Statistics – Various numbers associated with data.
- B.) Parameters – numbers associated with the entire population.
- C.) Samples – selected members of a population.

D.) Inferential Statistics – Statistics from a sample used to make inferences about a population.

E.) Margin of Error – A number associated with the possible percentage of error given with inferential statistics.

II. Measures of Central Tendency

A.) Mean – \bar{x} or μ Arithmetic average

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} = \frac{1}{n} \sum_{i=1}^n x_i$$

B.) Median – “Resistant” measure of central tendency. The middle value for a set of data. (odd – middle number, even – mean of the middle two numbers)

C.) Mode – The number that occurs the most often.

D.) Weighted Mean – Arithmetic average

$$\bar{x} = \frac{x_1w_1 + x_2w_2 + \dots + x_nw_n}{n} = \frac{\sum_{i=1}^n x_iw_i}{\sum_{i=1}^n w_i}$$

E.) Ex. 1– For a certain class, homework and class work is weighted 15%, quizzes 25%, and tests are weighted 60%. Jorge has a 95% homework average, 85% quiz average and he currently has two test grades (95 and 92). What does Jorge need to score on his third and final test to secure an A-average for the class, assuming his teacher does not round decimal grades.

$$90 = \frac{.15(95) + .25(85) + .60\left(\frac{95 + 92 + x}{3}\right)}{1}$$

$$90 = 14.25 + 21.25 + 37.4 + .2x$$

$$90 = 72.9 + .2x$$

$$17.1 = .2x$$

$$85.5 = x$$

$$x \geq 86$$

III. Five Number Summary

A.) Range \rightarrow max – min; Not resistant

B.) Interquartile Range $\rightarrow Q_3 - Q_1$

Q_1 = median of the lower $\frac{1}{2}$ of the data.

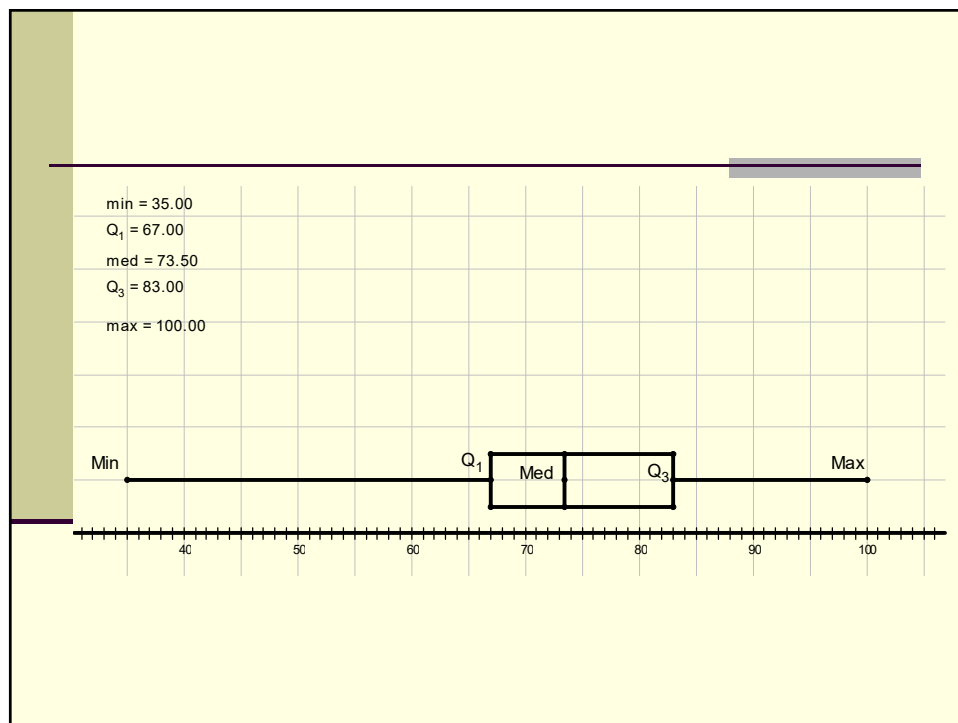
Q_3 = median of the upper $\frac{1}{2}$ of the data.

C.) 5 Num. Summary : (Min., Q_1 , Median, Q_3 , Max.)

IV. Boxplots

A.) AKA Box-and-whisker plot - A graph of the five number summary for the set of data.

We can draw them by hand or use the TI-83+.



B.) Outlier – Any number that lies more than 1.5 times the IQR above Q_3 or below Q_1 .

C.) Modified Boxplot – A replot without any outliers.

V. Variance and Standard Deviation

A.) Measures of spread of the data.

1.) Standard Deviation of a Population –

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

2.) Standard Deviation of a Sample -

$$s = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2}$$

B.) Variance – σ^2 and s^2

On TI-83 – Stat – Calc – 1-Var Stats

VI. The Normal Distribution

Def- A distribution (usually associated with probability) which models the shape of a bell. A normal distribution follows the 68-95-99.7 rule.

This means that

68.2% of the data lies between $\mu \pm 1\sigma$

95.4% of the data lies between $\mu \pm 2\sigma$

99.7% of the data lies between $\mu \pm 3\sigma$

