

STP226 Review notes for Test #1, chapters 1-3

1. Know new vocabulary and symbolic notation.
For example:
 - frequency, relative frequency, mean, median, quartiles, mode, interquartile range, z-score or standard score, stem-and leaf diagram, box plot
 - Know what is a symbol for mean and standard deviation for sample (statistics: \bar{X} , S) and for population (parameters: μ , σ).
 - Know how to distinguish different types of studies (descriptive, inferential).
 - Know the types of variables in the data (qualitative and quantitative (discrete, continuous))
 - Know how to obtain simple random sample (use random numbers tables)
 - Know what it means that sample is representative and random. Be able to give examples of samples that are not random or not representative of a given population.
 - Be able to distinguish between studies: descriptive and inferential, observational and design experiments. Know that observational study can't be used to determine causal effects of variables, but can only show association.

2. Know how to graphically represent your data and how to read and interpret given graphs and tables.
 - Box plot
 - Dot plot
 - Histogram
 - Frequency and Relative Frequency Table
 - Stem- and- leaf diagram
 - Bar and pie charts

3.
 - Know all measures of center (mean, mode, median) and dispersion (variability) (range, standard deviation, variance) for the sample. Make sure to know how to use both, defining formula and computational formula, for computing S by hand.
 - Be able to find median and quartiles by hand, remember to order data first. For odd number of observations median=middle data value, if number of data points is even, median=average of two middle values.
For computing quartiles if n is odd your book computes Q_1 as median of data values less or equal to the overall median and Q_3 as median of the data values greater or equal to the overall median, which is different

from your calculator method where overall median is excluded from computations of quartiles 1 and 3.

For ex if your data is: 3, 4, 5, 8, 11, 15, 22
book gives $Med = Q_2 = 8$, $Q_1 = 4.5$ and $Q_3 = 13$ while your calculator gives also $Med = Q_2 = 8$ but $Q_1 = 4$ and $Q_3 = 15$

- Be able to tell what are units of each measure as compared to the units of your data. For example: If data is in inches, mean and st. deviation are also in inches, but variance is in inches²
- Know how the units change if there is a linear change in the data
Ex1: if data points x are changed to $y = x + 5$, (mean of y) = (mean of x) + 5, but st. deviation of y stays the same as st. deviation of x
Ex2: if data points x are changed to $y = 3x$, (mean of y) = 2(mean of x) and (st. deviation of y) = 2(st. deviation of x)
- Make sure to know how to interpret each measure, what each tells you about the data. For ex. data set with larger S has more variability, larger spread, the distribution will have wider distribution (for. ex wider overall box plot)
- Be able to compare mean and median, decide their respective position in the sample based on the distribution shape.
For example: for nearly symmetric data mean is about the same as the median, for data left skewed, mean < median and for data right skewed, mean > median.
- Know how to check for outliers in the data by using IQR measure. Outliers are data points that lie outside of the upper and lower limits (UL and LL) , where $UL = Q_3 + 1.5IQR$ and $LL = Q_1 - 1.5IQR$. Know also that IQR measures variability (spread) of the middle 50% of the data, wider box in a box plot means that middle 50% of the data is more variable (when comparing data sets)
- Be able to compute and interpret the z-scores in relation to the mean (for example if $z = -1.5$, the observation is 1.5 standard deviations below the mean).
- Know Three Standard Deviations Rule.
- Know the differences in notation and computations between the population parameters and sample statistics.
- Know how to describe the shape of the distribution by looking at the histogram, box plot or stem-and-leaf diagram.
(use descriptions like: Symmetric, nearly symmetric, bell shaped, uniform, triangular, left skewed, slightly right skewed etc.)