**Colorado Technical University**

**Course:** MATH366 – Probability and Statistics

**Unit 3 Part 05 Readings: Central Tendency,**

**Variability, and Multiple Comparison Charts**

**Descriptive statistics** - describe the sample

**Observation -** a member of a data set

**Sample size** - the total number of observations in your sample

**Maximum and minimum values**

**Sample size** - the total number of observations in your sample

#### Averages "Measures of Central Tendency"

Where the data "tend to center"

Remember Σ means "sum of "

≡ means "is defined to be"

mean ≡ Σ (observations)

# observations

called "μ" for a population "x̄" for a sample

The sample mean x̄ is our best estimate of the (unknown) population mean μ

*note: to get the x̄ symbol in Word, you need to type:* ***x ALT+0772***

median => list all observations lowest to highest

the median is the middle value in the list (for an odd # of observations)

the median is the mean of the two middle values in the list (even #)

mode ≡ the most common observation (may be more than one)

midrange ≡ max + min

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### Measures of Variability

### While an average tells you where the data in your sample tend to pile up, how much they spread out from that center is also critical

range ≡ max –min

interquartile range ≡ 3rd quartile value – 1st quartile value “IQR”

range rule of thumb ≡ (max – min)/4

deviation ≡ each obs – mean

population variance ≡ Σ (deviations)2 called "σ2" "sigma-squared"

# observations

sample variance ≡ Σ (deviations)2 called "s2"

# observations - 1

population standard deviation ≡  called "σ " "sigma"

sample standard deviation ≡  called "s"

#### Outliers can really affect your statistics!

For a graph showing both averages and the variability of the data use a:

**Multiple Comparison Chart**

**Multiple Comparison Charts**

These graphs allow the viewer to see the differences in a continuous (measured or counted)

variable between qualitative groups

Sort of a boxplot comparison for measurement data

These are done using the Excel "High-Low-Close stock chart

Groups are different if their whiskers don't overlap (there is no box in this type of plot)

We start by using the maximum, minimum and median, but we will be using these graphs

for a variety of things using a variety of variables as the course progresses

Using the maximum and minimum will mean we can find fewer different groups

Later versions of the Multiple Comparison Graph will eliminate this problem

**Chart, box and whisker chart

Description automatically generated**

**Adding the Analysis ToolPak in Microsoft Office Excel**

Click on the 'File' button at the top left of the screen

At the bottom of the drop down menu, click on the 'Excel Options' button

The Excel Options window will open

In the column on the left, click on the 'Add-Ins' heading

Click the 'Go' Button - an 'Add-Ins' window will open.

Click in the checkbox next to 'Analysis ToolPak'

Click the 'OK' button

When it is finished, click on the 'Data' tab

The Analysis group will be on the right side of the ribbon

If “Data Analysis” is not there, your installation of the ToolPack didn’t work