Main Ideas/Questions	Notes/Examples
MEASURES OF CENTRAL TENDENCY	A value that describes the center/middle of data Mean (μ / $\bar{x}$): the average Median: the middle value Mode(s): the most repeated value **Directions:** Find the mean, median, and mode(s) for each data set. **1.** {58, 53, 59, 51, 46, 35, 51, 58, 60} 35, 46, 51, 51, 53, 58, 58, 59, 60 = 52.3 Mean = 52.3 Median = 53 Mode(s) = 51, 58 **2.** {21, 10, 27, 24, 15, 7, 19, 24, 31, 11, 24} 7, 10, 11, 15, 15, 19, 21, 24, 24, 27, 31 Mean = 52.3 19+21=40÷2=20 Median = 20 Mode(s) = 24
MEASURES OF VARIATION	a value that describes how spread out the data is. (measures dispersion) score - average = distance from av
Mean Absolute Deviation (MAD)	the average distance of each value to the mean sum $MAD = \frac{\sum_{i=1}^{n} \lvert x_i - A \rvert}{n}$ **Directions:** Find the mean absolute deviation for each data set. **3.** {85, 74, 88, 80, 92, 60} mean = 79.83 −79.83 (5.17 + 5.83 + 8.17 + .17 + 12.17 + 19.83) = 51.34 6 MAD = 8.56 **4.** {14, 18, 16, 19, 21, 14, 15, 23, 21, 19} mean = 18 −18 (+) = 26 10 MAD = 2.6

Variance (σ^2)	the average squared distance of each value to the mean	$\sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \mu)^2}{n}$
Standard Deviation (σ)	square root of the variance *most important measure	$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \mu)^2}{n}}$
What do the numbers mean?	• A **lower standard deviation** indicates that the values are closer together • A **higher standard deviation** indicates that the values are more spread out	

Examples

Directions: Find the variance and standard deviation for each data set.

5. {85, 88, 91, 96, 100} mean = 92

-92

$(-7)^2, (-4)^2, (-1)^2, 4^2, 8^2$

$\frac{49+16+1+16+64}{5} = \frac{146}{5} = 29.2 = 5.40$

Variance (σ^2) = 29.2

Standard Deviation (σ) = 5.40

Calculator Steps:

- Hit **STAT, ENTER**
- Enter the data values in **L1**
- Hit **STAT**
- Arrow over to **CALC**
- Choose **#1:1-Var Stats**
- Hit **ENTER**
- Scroll down to find σ
- Square to find σ^2

6. {3, 4, 7, 8, 11, 12, 12, 15, 19}

home, lists, type list, newbox

menu - 4 - 1 - 1 - ok - ok

Variance (σ^2) = 23.61

Standard Deviation (σ) = 4.86

7. {52, 47, 60, 55, 58, 53, 59, 63}

Variance (σ^2) = 23.14

Standard Deviation (σ) = 4.81

8. {127, 81, 135, 100, 97, 115, 72, 152, 63, 164}

Variance (σ^2) = 1038.8

Standard Deviation (σ) = $(32.22)^2$

9. {25, 27, 21, 32, 35, 29, 23, 26, 24, 25, 28, 31}

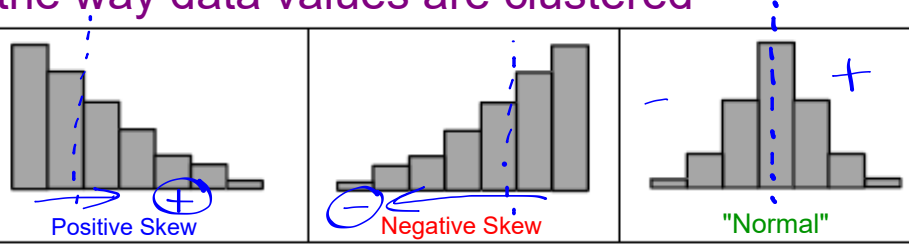
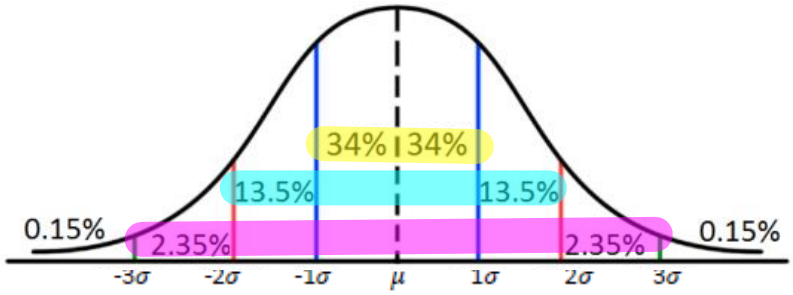
Variance (σ^2) = 14.98

Standard Deviation (σ) = 3.87

Statistics: → on → Lists & Spreadsheet

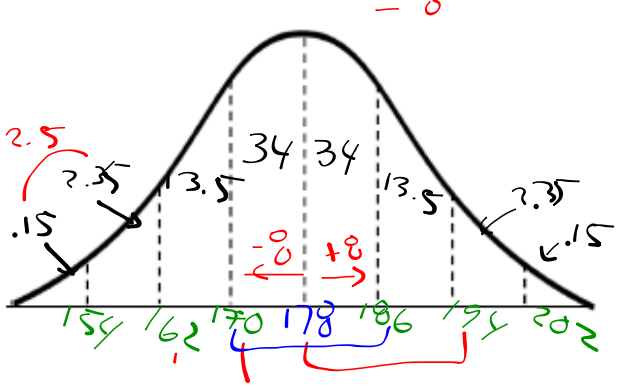
a. Enter list: 121, 65, 45, 130, 150, 83

Menu → 4: Statistics → 1:Stat Calculations → 1: One-Variable Statistics → OK → OK

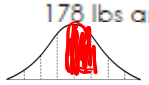
Main Ideas/Questions	Notes/Examples
Data Distribution	the way data values are clustered 
Normal Distribution	• A symmetrical bell-shaped curve defined by the **mean (μ)** and the **standard deviation (σ)** of the data set. • The **area under the curve** represents probability, with the total area equal to 100%.
The Empirical Rule	**In a normal distribution with mean μ and standard deviation σ:** • Approximately 68% of the data falls within 1σ of the mean. • Approximately 95% of the data falls within 2σ of the mean. • Approximately 99.7% of the data falls within 3σ of the mean. 

Directions: Draw and label normal distribution curves, then answer the questions.

1. The weights of the 50 football players are normally distributed with a mean of 178 pounds and a standard deviation of 8 pounds.

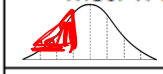


a) What percent of the players weigh between 178 lbs and 194 lbs?



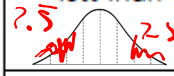
34 + 13.5 = 47.5%

b) What is the probability that a player weighs at most 170 lbs?



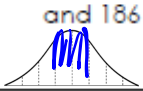
13.5 + 2.35 + .15 = 16%

c) What is the probability that a player weighs less than 162 lbs or greater than 194 lbs?



2.5 + 2.5 = 5%

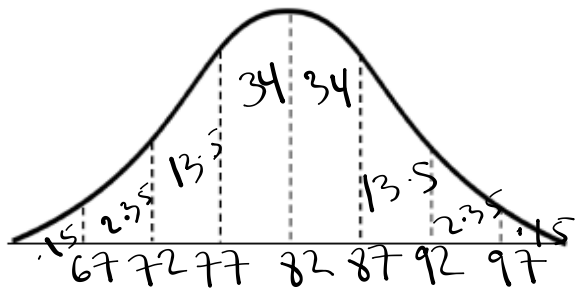
d) How many players weigh between 170 lbs and 186 lbs?



68% of 50

.68 × 50 = 34 players

2. A set of 120 test scores are normally distributed with a mean of 82 and a standard deviation of 5.

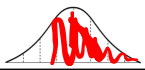


.05 × 120 =

a) What percent of the scores are between 72 and 87?

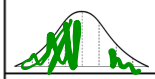
13.5 + 34 + 34 = 81.5%

b) What is the probability that a score is greater than 77?



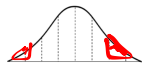
84%

c) What is the probability that a score is less than 82 or greater than 92?



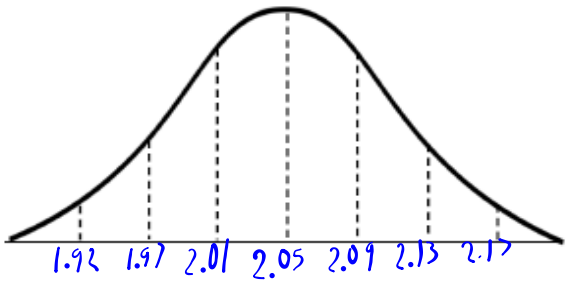
52.5%

d) About how many students scored outside two standard deviations of the mean?

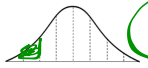


5% = 6 students

3. The price of a gallon of regular gasoline at 75 gas stations across the state is normally distributed with a mean of $2.05 and a standard deviation of 4¢.

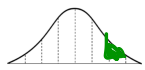


a) What percent of gas stations sell a gallon of regular gas for less than $1.97?



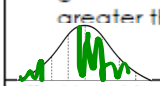
2.5%

b) What percent of gas stations sell a gallon of regular gas for at least $2.17?



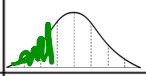
0.15%

c) What is the probability that a gas station sells a gallon of regular gas for less than $1.97 or greater than $2.05?



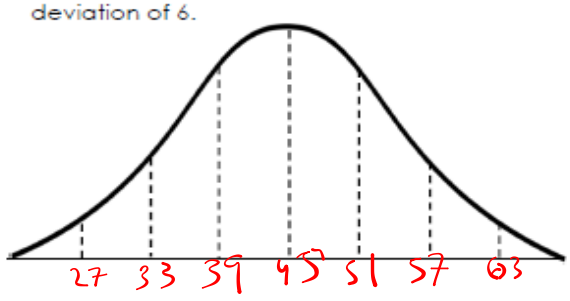
52.5%

d) About how many stations sell a gallon of regular gas for no more than $2.01?



12 75(.16) = 12

4. Mrs. Fuller recently tested her 120 keyboarding students to see how many words per minute they can type. The results were normally distributed with a mean of 45 and a standard deviation of 6.



a) About how many students can type at least 39 words per minute?

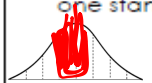
round down, whole humans

84%

120 · .84 = 100.8 ↓

100 students

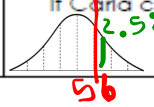
b) About how many students can type within one standard deviation of the mean?



68%

120 · .68 = 82

c) Students need to be in the top 2% in order to be eligible for the national typing competition. If Carla can type 56 wpm, is she eligible?



NO, not in top 2%

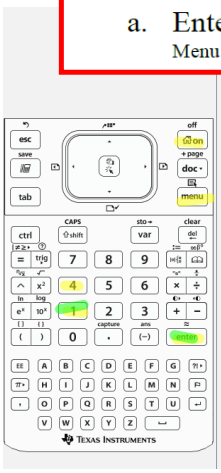
Not even top 2.5%

Calculator How to:

Statistics: → on → Lists & Spreadsheet

a. Enter list: 85,88,91,96,100, while in new box click

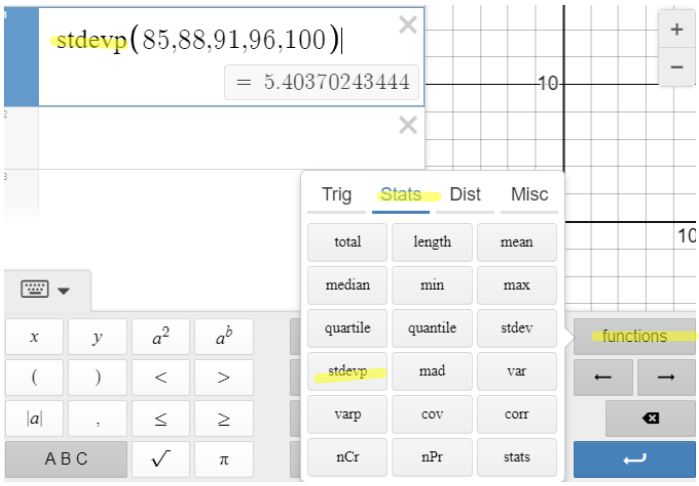
Menu → 4: Statistics → 1:Stat Calculations →1: One-Variable Statistics →OK →OK



	A	B	C
=			=OneVar(
2	88	$\bar{x}$ average	92.
3	91	Σx	460.
4	96	Σx^2	42466.
5	100	sx := sn-...	6.04152
6		standard deviation σx := σn...	5.4037

→ $(5.40)^2$=var

Desmos



Name: _____ **Unit 11:** Probability & Statistics

Date: _____ **Bell:** _____ **Homework 5:** Measures of Center, Variation, and Normal Distribution

** **This is a 2-page document!** **

Directions: Find the mean, median, and mode of each data set below.

1. {11, 14, 11, 5, 17, 28, 3}

Mean = _____

Median = _____

Mode(s) = _____

2. {24, 29, 31, 16, 49, 52, 29, 35, 62, 29}

Mean = _____

Median = _____

Mode(s) = _____

3. The following data shows the number of fish caught by a seven boy scouts on their camping trip:
{1, 2, 2, 4, 5, 6, 8} Mean = 4

$\frac{3+2+2+0+1+2+4}{7}$

MAD = 2

Variance: σ^2 = 5.43

Standard Deviation: σ = 2.33

4. The following data shows the points scored by a football team during their first ten games of the season: {27, 32, 41, 9, 14, 20, 31, 33, 20, 13}

MAD = _____

Variance: σ^2 = _____

Standard Deviation: σ = _____

5. The following data shows the high temperature for the past eight days:
{66, 46, 53, 50, 52, 47, 45, 49}

MAD = _____

Variance: σ^2 = _____

Standard Deviation: σ = _____

6. The following data shows the price of six different jars of pasta sauce at the grocery store:
{$2.79, $1.99, $4.29, $2.49, $2.29, $3.49} mean = 2.89

$\frac{.10+.90+1.40+.40+.60+.60}{6}$

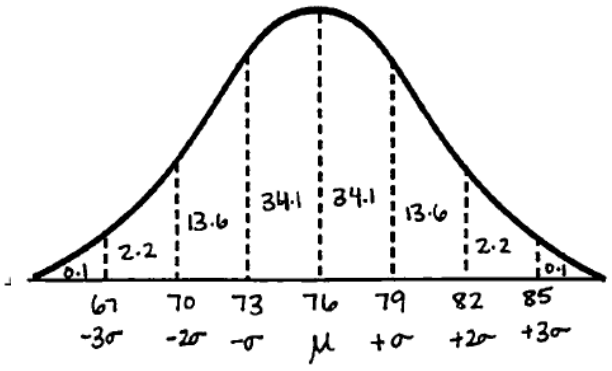
MAD = 0.67

Variance: σ^2 = 0.61

Standard Deviation: σ = 0.78

For questions 7 and 8, draw the normal distribution curve, then answer the questions.

7. A set of 125 golf scores are normally distributed with a mean of 76 and a standard deviation of 3.



a) What percent of the scores are between 67 and 85?

99.8%

b) What is the probability that a score is no more than 79?

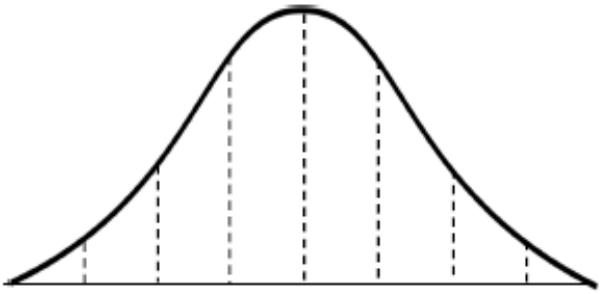
84.1%

c) About how many scores fell between one standard deviation of the mean?

68.2% of 125 = 85.25

About 85 scores

8. The talk-time battery life of a group of cell phones is normally disributed with a mean of 5 hours and a standard deviation of 15 minutes.



a) What percent of the phones have a battery life of at least 4 hours and 45 minutes?

b) What percent of the phones have a battery life between 4.5 hours and 5.25 hours?

c) What percent of the phones have a battery life less than 5 hours or greater than 5.5 hours?

9. The number of hours that the employees at the grocery store worked last week is normally distributed with a mean of 24 and a standard deviation of 6. If there are 60 total employees, approximately how many worked at least 30 hours last week?

10. The grade point average (GPA) of the students at Lakeview High School is normally distributed with a mean of 3.1 and a standard deviation of 0.3. If there are 1800 students enrolled at the school, approximately how many have a GPA between 2.5 and 3.7?