WARM UP

1. Simplify the expression $\mathrm{sec}c\theta\ cot\theta\ sin\theta$

2. Simplify the expression $\dfrac{sec\theta - cos\theta}{sec\theta}$

3. Identify the amplitude phase shift, period and midline for the function $y = \sin(x + 2) + 1$

Objectives

- Interpret the data presented in a normal curve
- Use the zScore to create a standard normal curve
- Use zScore and Standard Deviation

Homework

- Section 11-9 all problems
- Worksheet on Normal Distributions

Homework Review

2. 8, 16, 12, 15, 4
mean: 11
variance: 20
standard deviation: ≈ 4.5

3. 25, 18, 20, 19, 22, 16
mean: 20
variance: ≈ 8.3
standard deviation: ≈ 2.9

4. 27, 34, 45, 30, 26, 42
mean: 34
variance: ≈ 52.3
standard deviation: ≈ 7.2

Use a graphing calculator to solve the following problems.

5. The most recent test scores for a math class are displayed in the table below. What are the mean and the standard deviation for this data set?

Student	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Score	77	86	79	94	65	82	76	97	65	77	89	78	84	79	88

mean ≈ 81; standard deviation ≈ 8.8

6. Your sister's bowling scores for the last 12 games are displayed in the table below. What are the mean and standard deviation for this data?

Game	1	2	3	4	5	6	7	8	9	10	11	12
Score	212	187	176	205	193	229	201	175	203	216	227	235

mean ≈ 205; standard deviation ≈ 19

Homework Review

7. You brother is buying his textbooks for his first semester of college. The price of each of his books is shown in the table below. The mean of the data set is $65.85, and the standard deviation is about 36. Within how many standard deviations of the mean do all of the prices fall?

Book	1	2	3	4	5	6
Price	$25.60	$57.00	$38.25	$126.40	$84.00	$63.85

All of the prices fall within two standard deviations of the mean.

8. The table below shows the weights of the five starting players on a basketball team. Within how many standard deviations of the mean do all of the weights fall?

Player	1	2	3	4	5
Weight (lb)	146	189	246	178	203

All of the weights fall within two standard deviations of the mean.

9. Open-Ended Describe an example of how it can be useful to know the standard deviation of a data set.

Answers may vary. Sample: A teacher can calculate the standard deviation of a class's test scores to see whether the whole class is achieving a similar level of academic performance. If the standard deviation is high, that indicates that there is a great deal of variation between students' academic performance.

10. Writing How is standard deviation similar to range and interquartile range?

All three measures give a sense of how much variation exists in a set of data.

Homework Review

11. Error Analysis Your classmate calculated the standard deviation of the data set shown below and got 46.53. What error did she make? What is the correct standard deviation?

Day	Mon	Tue	Wed	Thu	Fri	Sat	Sun
High Temperature (°F)	76°	82°	63°	69°	79°	84°	75°

She calculated the variance rather than the standard deviation. She needs to find the square root of the variance. The correct standard deviation is about 6.82.

Do you remember how to find Standard deviation on your calculator?

STAT | EDIT | enter the data in L1

STAT | CALC | 1: 1 – Var Stats

Select L1 for List and press enter

So the formula for Standard Deviation is…

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

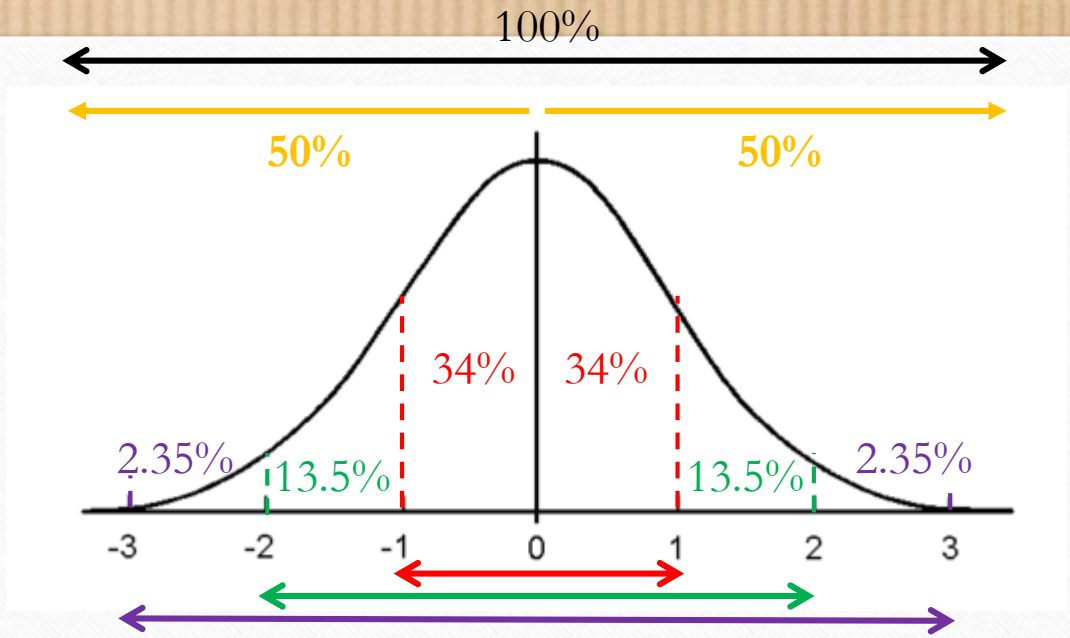
Normal Distribution

If a dataset has a normal distribution…

68% of the data falls within **1** standard deviation of the mean.

95% of the data falls within **2** standard deviation of the mean.

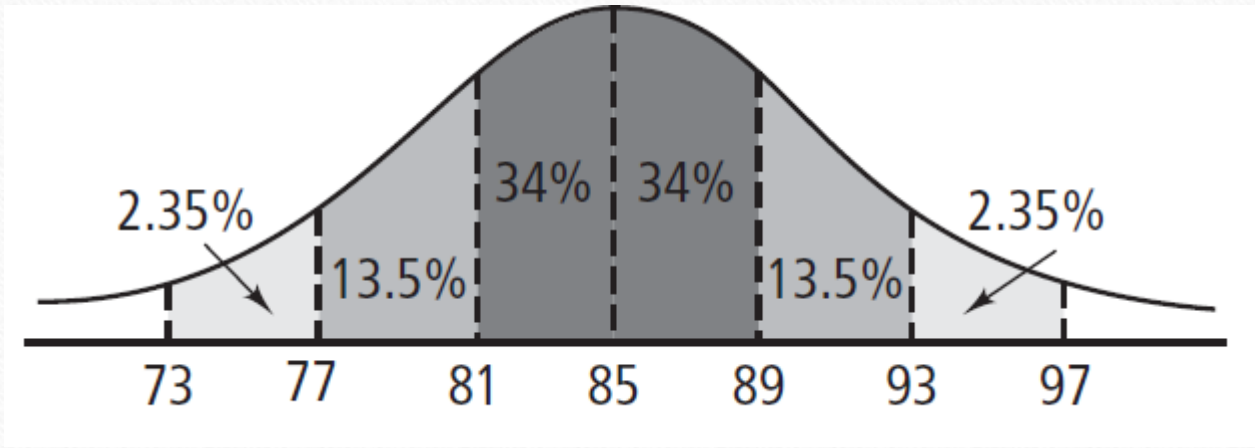
99.7% of the data falls within **3** standard deviation of the mean.



What about the other .3%? There's another .15% on either end of the curve.

Example

The weight in in pounds of newborn calves on a farm is normally distributed with a mean of 85 and a standard deviation of 4.



$$\bar{x} = 85$$

$$\sigma = 4$$

The z-score allows us to "standardize" data to a standard normal curve.

$$z = \frac{x - \bar{x}}{\sigma}$$

Let's look at the scores from the Trig Unit Test.

Mean = 74.24

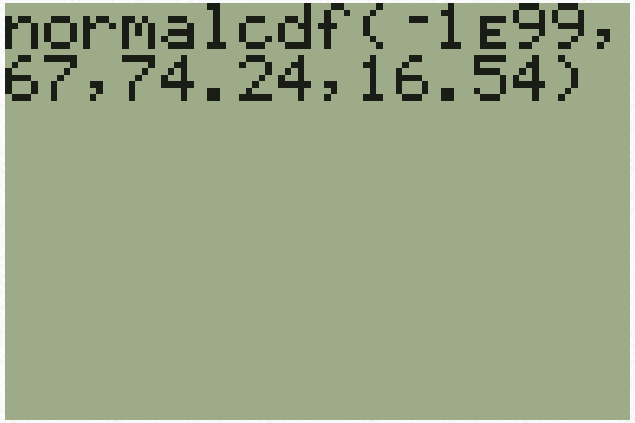
Standard Deviation = 16.54

Trigonometry Unit Test

24.66	41.2	57.74	74.28	90.82	107.36	123.90
$z = \frac{24.66 - 74.24}{16.54}$	$z = \frac{41.2 - 74.24}{16.54}$	$z = \frac{57.74 - 74.24}{16.54}$	$z = \frac{74.24 - 74.24}{16.54}$	$z = \frac{90.82 - 74.24}{16.54}$	$z = \frac{107.36 - 74.24}{16.54}$	$z = \frac{123.9 - 74.24}{16.54}$
-3	-2	-1	0	1	2	3

Ethel made a 67. Let's see how she did compared to everyone else in the class.

Get out your calculator.



2^{nd} | Vars |2: normalcdf

Upper: Ethel's score
μ: mean
σ: standard deviation

This gives you a percentage .3307 or 33.07%

This means that Ethel scored better than 33.07% of all the students who took this test.