

Ch. 2 Test is on Wednesday.
Consider doing some review
questions ahead of time either by
starting the end of Chapter Review
Exercises or the Ch. 2 AP Exam.

or... the Strive for a 5 stuff

Warm Up on #2 change
15% to 25%

Warm Up AP Stats 2.2 Day 3

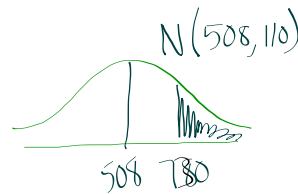
For each question, be sure to follow the steps for Normal Calculations from last class including drawing the appropriate pictures and show the appropriate formulas. *Remember: You get good at what and how you practice! Practice good communication by making your solution logical to follow.*

1. Are you worthy to be a University of Michigan Wolverine?

- a) The distribution of scores on the math section of the SAT (out of 800) follows an approximately Normal distribution with a mean of 508 and standard deviation of 110. The University of Michigan has a recommended math SAT score of at least 730. What percent of students who took the math SAT meet this requirement?

1. Are you worthy to be a University of Michigan Wolverine?

- a) The distribution of scores on the math section of the SAT (out of 800) follows an approximately Normal distribution with a mean of 508 and standard deviation of 110. The University of Michigan has a recommended math SAT score of at least 730. What percent of students who took the math SAT meet this requirement?



$$z = \frac{\text{Value} - \text{Mean}}{\text{SD}}$$

$$= \frac{730 - 508}{110} = 2.02$$

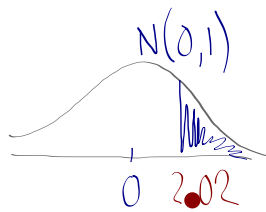


Table A

$$1 - .9783 = .0217$$

2.17%

- b) Use technology to check your answer. $\text{normalcdf}(730, 100000, 508, 110)$
 $= 2.18\%$

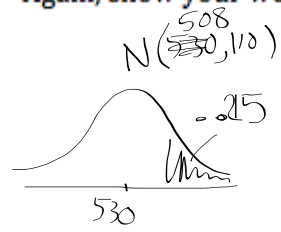
- c) Now write and interpret your answer.

About 2.2% of the students that took the SAT that year scored at least 730 on the math section

[it appears U of M is tough to get into]

2. What SAT Math score would be necessary to be in the top 15%
 Again, show your work following the steps from last class.

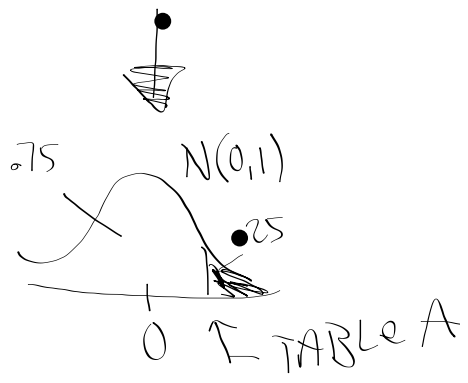
~~15%~~
25%



$$Z = \frac{\text{Value} - \text{mean}}{SD}$$

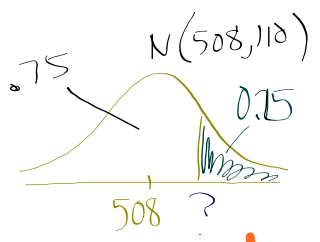
$$.67 = \frac{X - 508}{110}$$

$$X = 581.7$$



2. What SAT Math score would be necessary to be in the top 15%
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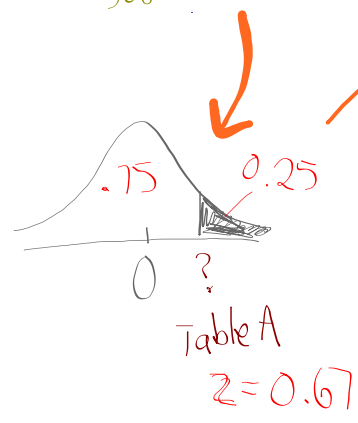
~~15%~~
25%



$$Z = \frac{\text{Value} - \mu}{\sigma}$$

$$0.67 = \frac{X - 508}{110}$$

$$X = 581.7$$



A score of around 581.7 would be required to be in the top 25%.

Check using technology

$$\text{invNorm}(0.85, 508, 110)$$

$$= 582.19$$

close

Below are the Ch. 1 Tests scores of Sheldon HS AP Stat students this year, 2019.
(in percents)

97	89	85	90	83	83	91
76	90	74	79	83	96	84
83	92	76	91	89	88	93
85	90	75	82			

Enter the scores in L_1 in your graphing calculator

Why not technology all the time ?

Why? Later in the course, we will be doing significance testing. The z-score will be our standardized test statistic and the area will be our P-value.

and ●●

between now and then you will see many Multiple Choice questions on your deep understanding of things.

When should I use technology?

- 1) Multiple Choice questions that focus on computations.
- 2) To check your answer on free response questions.

Remember the lady who could "smell Parkinsons" ?

- She correctly determined 11 out of 12 correct just by smelling

Remember the lady who could "smell Parkinsons" ?

- She correctly determined 11 out of 12 correct just by smelling

Using statistical inference procedures you will be able to determine if 11 out of 12 is good enough "prove" it.

but

**in order to do so, you will
have be sure the sample size
is adequate or that the data
is normally distributed**

Group A	-	Single Family Home Prices in certain city
	-	Survival times of cancer patients after treatment
	-	Number of Siblings for students in a statistics class
Group B	-	Highway gas mileage of 2018 for Honda Accords
	-	Weights of 9-ounce bags of potato chips
	-	Heights of 3-year old girls
	-	SAT Scores

Aim
today

Assess whether a set of data has an approximate normal distribution.

Assessing Normality

AP Stats Lesson 2.2 - Day 3

Do we have Normal test scores?

Here are the Chapter 1 Test scores for 80 of the current AP Statistics students

97	89	85	90	83	83	91
76	90	74	79	83	96	84
83	92	76	91	89	88	93
85	90	75	82			

Is the distribution of Chapter 1 Test scores approximately normal? Justify your answer using several different approaches. The group with the most convincing argument will win a prize.

← true

You have about
15 minutes

Did anyone check to see if
the scores fit the 68-95-99.7 rule?

mean ± 1 SD	85.8 ± 6.4	79.4 to 92.2	$17/25$	68%
mean ± 2 SD	$85.8 \pm 2(6.4)$	73 to 98.6	$25/25$	100%
mean ± 3 SD	$85.8 \pm 3(6.4)$	66.6 to 104	$25/25$	100%

Did anyone check to see if
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mean 85.8 ± 6.4 79.4 to 92.2
 ± 1 SD

mean $85.8 \pm 2(6.4)$ 73 to 98.6
 ± 2 SD

mean $85.8 \pm 3(6.4)$ 66.6 to 104
 ± 3 SD

Assessing Normality

Big Idea

Ways to Check

1.

2.

3.

4.

Assessing Normality

Big Idea

Ways to Check

1. Graph
Dot plot/histogram
2. Compare mean & median
3. Check 68-95-99.7 Rule
- 4.

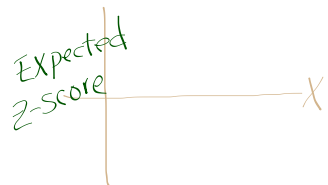
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Normal Probability Plot (done by calculator)



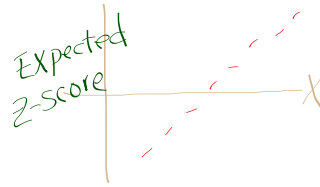
Assessing Normality

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Ways to Check

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Dot plot/histogram
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4. Normal Probability Plot (done by calculator)

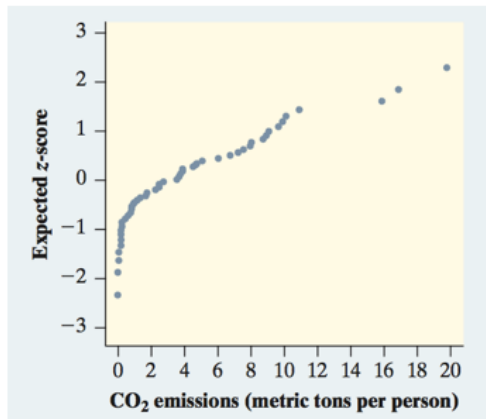


If normal prob. Plot is approx. linear then distribution of data is approx. normal.

Let's look at one from the test scores

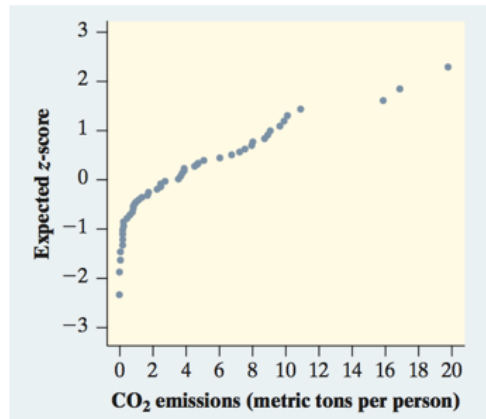
Check Your Understanding:

1. The following figure is a **Normal probability plot** of the emissions of carbon dioxide (CO₂) per person in 48 countries. Use the graph to determine if this distribution of CO₂ emissions is approximately Normal.



Check Your Understanding:

1. The following figure is a **Normal probability plot** of the emissions of carbon dioxide (CO_2) per person in 48 countries. Use the graph to determine if this distribution of CO_2 emissions is approximately Normal.



Which
is more
articulate
?

The distribution of CO_2 emissions is not approx. normal because the normal prob. plot is not linear.

It is not approx normal because it is not linear

Which
is more
articulate

The distribution of CO_2 emissions is not approx. normal because the normal prob. plot is not linear.

?

It is not approx normal because it is not linear

In AP Stats "it"
is a bad word

You get 1 hour detention
if you use it

↖
hah!

2. No space in the fridge?

The measurements listed below describe the usable capacity (in cubic feet) of a sample of 36 side-by-side refrigerators (Consumer Reports, May 2010).

12.9 13.7 14.1 14.2 14.5 14.5 14.6 14.7 15.1 15.2 15.3 15.3 15.3
 15.3 15.5 15.6 15.6 15.8 16.0 16.0 16.2 16.2 16.3 16.4 16.5 16.6
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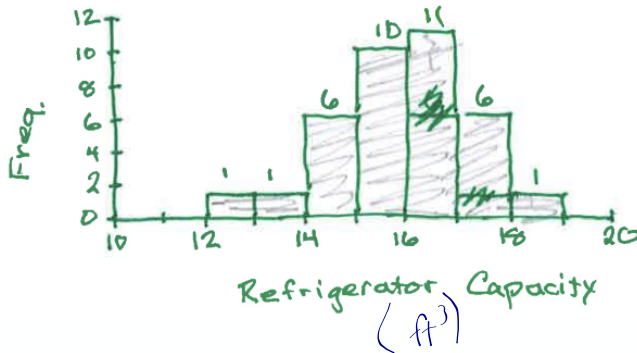
- a) Enter the data into your calculator. Then make a graph that illustrates the distribution of capacities (a histogram would be the best). Make a quick in the space below. *How would you describe the shape of the distribution?*

No space in the fridge?

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16.6 16.6 16.8 17.0 17.0 17.2 17.4 17.4 17.9 18.4

1. Enter the data into your calculator. Then make a graph of the data and sketch it in the space below. How would you describe the shape of the distribution?



Fairly symmetric,
 single peaked
 unimodal
 approx. normal

2. Calculate one-variable statistics. Compute the percent of data values that are within 1, 2, and 3 standard deviations of the mean. How closely does this distribution follow the 68–95–99.7 rule?

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$$\text{mean} \pm 1 \text{ SD: } 15.825 \pm 1.217$$

$$\text{mean} \pm 2 \text{ SD: } 15.825 \pm 2(1.217)$$

$$\text{mean} \pm 3 \text{ SD: } 15.825 \pm 3(1.217)$$

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mean \pm 1 SD: 15.825 \pm 1.217 14.608 to 17.042 25/36
 mean \pm 2 SD: 15.825 \pm 2(1.217) 13.391 to 18.259 34/36
 mean \pm 3 SD: 15.825 \pm 3(1.217) 12.174 to 19.476 36/36

68% 69.4%
 95% 94.4%
 99.7% 100%

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mean \pm 1 SD: 15.825 \pm 1.217 14.608 to 17.042 24 out of 36 = ~~67~~ 67%
 mean \pm 2 SD: 15.825 \pm 2(1.217) 13.391 to 18.259 34 out of 36 = 94.4%
 mean \pm 3 SD: 15.825 \pm 3(1.217) 12.174 to 19.476 36 out of 36 = 100%

- These percents are close to 68%, 95%, and 99.7% targets for a Normal distribution.
- Both the graphical evidence from #1 and numerical evidence from part 2 suggests that this distribution is approx. normal

3. Make a normal probability plot of the capacities to verify your findings.

Partner

LCO

See your

2.2..... 73, 75, 77, 79, 81, 85-90 and
study pp. 131-136