NAME Aleksandr Gorokhov

#11 ~~#10~~

Worksheet #11

1. A simple random sample of 125 SAT scores has a mean of 1522. Assume that all SAT scores have a standard deviation of 333.

a. Construct a 95% confidence interval estimate of the mean SAT score.

$n=125$, $\bar{x}=1522$, $s=333$

0.95 $df=125-1=124$ $t_{\frac{\alpha}{2}}=1.984$

$E=t_{\frac{\alpha}{2}}\cdot\frac{s}{\sqrt{n}}=(1.984)\left(\frac{333}{\sqrt{125}}\right)=59.1$

$1522-59.1<\mu<1522+59.1$

$1462.9<\mu<1581.1$

b. Construct a 99% confidence interval estimate of the mean SAT score.

$df=125-1=124$ $t_{\frac{\alpha}{2}}=2.626$

$E=(2.626)\left(\frac{333}{\sqrt{125}}\right)=78.2$

$1522-78.2<\mu<1522+78.2$

$1443.8<\mu<1600.2$

2. In a test of a certain diet plan, 40 individuals participated in a randomized trial of overweight adults. After twelve months, the weight loss was found to be 2.1 lb, with a standard deviation of 4.8 lb.

a. What is the best point estimate of the mean weight loss of all overweight adults who follow this diet plan?

2.1 lb

b. Construct a 95% confidence interval estimate of the mean weight loss for all such subjects.

$df=40-1=39$

$E=2.023\left(\frac{4.8}{\sqrt{40}}\right)=1.54$

$2.1-1.54<\mu<2.1+1.54$

$0.56<\mu<3.64$

3. A simple random sample of 50 adults is obtained, and each person's red blood cell count is measured. The sample mean is 4.63. The population standard deviation for red blood cell counts is 0.54.

Construct a 99% confidence interval estimate of the mean red blood cell count of adults.

$n = 50 \quad \bar{x} = 4.63 \quad \sigma = 0.54$

$1 - \alpha = 0.99$

$\alpha = 0.01$

$\frac{\alpha}{2} = 0.005$

$z_{\frac{\alpha}{2}} = 2.575$

$E = 2.575\left(\frac{0.54}{\sqrt{50}}\right) = 0.20$

$4.63 - 0.20 < \mu < 4.63 + 0.20$

$4.43 < \mu < 4.83$

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Worksheet #10

1. How do you calculate p̂?

$\hat{p} = \frac{x}{n}$

2. How do you calculate the confidence interval? (give the general formula)

$\hat{p} - E < p < \hat{p} + E$

3. How do you calculate the sample size:
   a. When p̂ is known?

   $n = \frac{(z_{\frac{\alpha}{2}})^2 \hat{p}\hat{q}}{E}$

   b. When p̂ is unknown?

   $n = \frac{(z_{\frac{\alpha}{2}})^2 (0.25)}{E^2}$

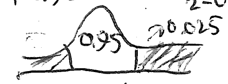
4. Find the margin of error: n = 500, x = 220, 99% confidence

$p = \frac{220}{500} = 0.44$ $\quad E = z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}\hat{q}}{n}}$ $\quad E = 2.575\sqrt{\frac{(0.44)(0.56)}{500}} = 0.0572$

5. Construct the confidence interval: n = 2000, x = 400, 95% confidence

$\hat{p} = \frac{400}{2000} = 0.2$ $\quad E = 1.96\sqrt{\frac{(0.2)(0.8)}{2000}} = \boxed{0.0175}$

$1-0.95=0.05$ $\quad z_{\frac{\alpha}{2}} = 0.025$



$0.2 - 0.0175 < p < 0.2 + 0.0175$

$0.1825 < p < 0.2175$

6. According to a survey, 73% of adults use the Internet. Construct a 95% confidence interval estimate of the proportion of all adults who use the Internet. Is it correct for a newspaper reporter to write that "3/4 (75%) of all adults use the Internet? Why or why not?

$x = 73$
$n = 100$
$p = 0.73$

$E = 1.96\sqrt{\frac{(0.73)(0.27)}{100}} = 0.0870$

$0.73 - 0.0870 < p < 0.73 + 0.0870$

$0.643 < p < 0.817$ Yes, because 75% falls within 0.643 and 0.817

7. When Mendel conducted his famous genetic experiments with peas, one sample resulted in 428 green peas and 152 yellow peas. Construct a 99% confidence interval of the proportion of yellow peas.

$x = 152$
$n = 580$
$p = \frac{152}{580} = 0.26$
$q = 0.74$

$E = 2.575\sqrt{\frac{(0.26)(0.74)}{580}} = 0.0465$

$0.26 - 0.0465 < p < 0.26 + 0.0465$

$0.2135 < p < 0.3065$

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Worksheet #9

1. Based on data from a health survey, assume that the weights of women are normally distributed with a mean of 125 lb and a standard deviation of 16 lb.

   a. Find the probability that if an individual woman is randomly selected, her weight will be greater than 132 lb.

   $$P\left(z > \frac{132-125}{16}\right) = P(z > 0.44) = 1 - 0.6700 = 0.330$$

   b. Find the probability that 20 randomly selected woman will have a mean weight that is greater than 132 lb.

   $$P\left(z > \frac{132-125}{16/\sqrt{20}}\right) = P(z > 1.96) = 1 - 0.9750 = 0.025$$

2. Nine candidates take an IQ test, and their mean IQ score is 133. Assume IQ scores are normally distributed with a mean of 100 and a standard deviation of 15.

   a. If 1 person is selected randomly from the population, find the probability of getting someone who's IQ score is at least 133.

   $$P\left(z \geq \frac{133-100}{15}\right) = P(z \geq 2.20) = 1 - 0.9861 = 0.0139$$

   b. If 9 people are randomly selected, find the probability that their mean IQ score is at least 133.

   $$P\left(z \geq \frac{133-100}{15/\sqrt{9}}\right) = P(z \geq 6.6) = 1 - 0.9999 = 0.0001$$

   c. Why can the central limit theorem be used in part b, even though the sample size does not exceed 30?

   Because the original population is normally distributed.

3. Find the following propabilities:

$P(-1.23 < z < 2.12) = 0.9830 - 0.1093 = 0.8737$

$P(z > -0.13) = 1 - 0.4483 = 0.5517$

4. Find $z_{.37} = 0.33$

5. Find $z_{.24} = 0.71$

6. Find $P_{.70} =$ ~~0.7580~~ 0.52

7. Find $P_{.35} =$ ~~0.6368~~ 0.39

9.5/10

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Worksheet #6
(Quiz #1)

1. A couple has three children. Assume that boys and girls are equally likely to occur. Write out the sample space.

{bbb, bgg, bbg, ggg, gbg, ggb, bgb, gbb}

What is the probability that they will have no more than 1 girl?

$\frac{4}{8} = \frac{1}{2}$

What is the probability that they will have 2 or more girls?

$\frac{4}{8} = \frac{1}{2}$

2. Given the following probability distribution, calculate the mean and the standard deviation.

x	P(x)	x · P(x)	$x^2 \cdot P(x)$
0	0.125	0	0
1	0.375	0.375	0.375
2	0.375	0.75	1.50
3	0.125	0.375	1.125
		$\mu = \Sigma x \cdot P(x)$ 1.50	3

$\mu = 1.50$

$\sigma = \sqrt{3 - (1.50)^2} = 0.8660$

Round to .9

3. Calculate the mean and standard deviation:

x	f(x)	X	f·X	f·x^2
10-19	3	14.5	43.5	630.75
20-29	12	24.5	294	7203
30-39	14	34.5	483	16663.5
40-49	8	44.5	356	15842
	$\Sigma f(x) = 37$		$\Sigma f(x) = 1176.5$	$\Sigma f \cdot x^2 = 40339.25$

$$S = \sqrt{\frac{37(40339.25) - (1176.5)^2}{37(37-1)}} = 9.02$$

$$\bar{X} = \frac{1176.5 \;\; \cancel{40339.25}}{37} = \cancel{1090.25} \;\; 31.8$$

4. For the following set of numbers find the **5-number summary** and construct a modified **box plot**. Don't forget to identify outliers!

any outliers? $-\frac{1}{2}$

3 14 15 21 34 12 4 2 8 40 80

2 3 4 8 12 14 15 21 34 40 ~~80~~

n = 11

min = 2

$Q_1 = P_{25}$ $\frac{25}{100} \times 11 = 2.75 \uparrow 3rd$

$Q_2 = P_{50}$ $\frac{50}{100} \times 11 = 5.5 \uparrow 6th$

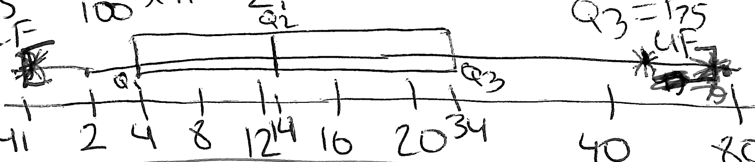
$Q_3 = P_{75}$ $\frac{75}{100} \times 11 = 8.25 \uparrow 9th$

$Q_1 = 4$

$Q_2 = 14$

$Q_3 = 34$

max = 80



$IQR = Q_3 - Q_1 = 34 - 4 = 30$

$LF = 4 - 1.5(30) = -41$

$UF = 34 + 1.5(30) = 79$

5-Number Summary = (2, 4, 14, 34, 80)

5. Define statistics:

Collection of data that is organized ~~and~~ into charts, tables, diagram's, etc. We can draw conclusions from this statistic.

6. Given the following list of data, what percentile is 24?

42 23 16 22 74 65 12 2 5 41 24 52 32 28

2 5 12 16 22 23 24 28 32 41 42 52 65 74

n = 14

~~$\frac{24}{100} \times 14 = 3.36$~~ $P_{24} = \frac{6}{14} \times 100 = 42.9\%$ or 43rd percentile

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Worksheet ~~#6~~ #7
Review for Test 1

1. Define the following:

Parameter:

- a numerical characteristic of a population.

Data:

- information that we collect.

2.

24 16 29 15 17 23 32 18 12 10 35 25 27 34 41

Construct a frequency table AND a relative frequency table, with the first class having a lower class limit of 10 and a class width of 10.

	frequency	relative frequency
10-19	6	0.40
20-29	5	0.33
30-39	3	0.20
40-49	1	0.067

3. Find the 5-number summary **and** make a boxplot. Are there any outliers?

$IQR = Q_3 - Q_1 = 35 - 18 = 17$

$LF = 18 - 1.5(17) = -7.5$

$UF = 35 + 1.5(17) = 60.5$

any # outside of these are outliers

4, 29, 12, 23, 32, 48, 41, 25, 16, 21, 35, 25, 26, 42, 18

4, 12, 16, 18, 21, 23, 25, 25, 26, 29, 32, 35, 41, 42, 48

min = 4

$Q_1 = 18$

$Q_2 = 25$

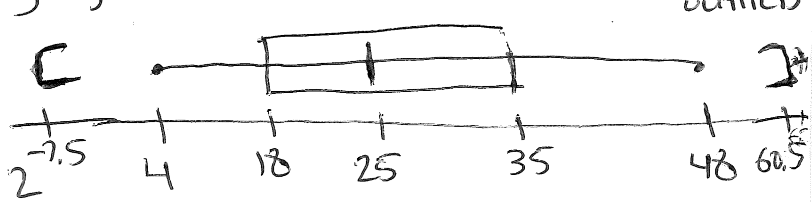
$Q_3 = 35$

max = 48

$Q_1 = \frac{25}{100} \times 15 = 3.75 \uparrow 4$

$Q_2 = \frac{50}{100} \times 15 = 7.5 \uparrow 8$

$Q_3 = \frac{75}{100} \times 15 = 11.25 \uparrow 12$



$\boxed{\text{5-Number Summary} = (4, 18, 25, 35, 48)}$

1

4. Grade (%)	Frequency	x	$f \cdot x$	$f \cdot x^2$
50-~~6~~59	4	54.5	218	11,881
60-69	2	64.5	129	8320.5
70-79	12	74.5	894	66,603
80-89	18	84.5	1521	128,524.5
90-100	14	94.5	1323	125,023.5
	$\Sigma f = 50$		$\Sigma f x = 4085$	$\Sigma f \cdot x^2 = 340{,}352.5$

Find the mean, variance, and standard deviation. Is it usual for a student to get a 64%? Explain why or why not.

$$\bar{x} = \frac{4085}{50} = 81.7\%$$

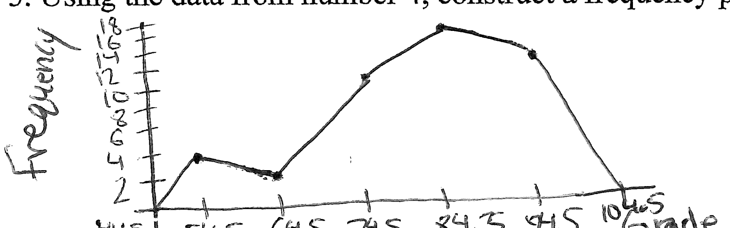
$$s^2 = \frac{50(340{,}352.5) - (4085)^2}{50(50-1)} = 134.9 \text{ variance}$$

$$s = 11.6$$

58.5 70.1 81.7 93.3 104.9

It is usual to get 64% because it falls within 2 standard deviations.

5. Using the data from number 4, construct a frequency polygon.



6. The average salary for dentists is $90,000 with a standard deviation of $7,500. What is the z-score for a dentist that makes $102,000? Is this usual or unusual? Why or why not??

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

$$z = \frac{102{,}000 - 90{,}000}{7{,}500} = 1.6$$ This is usual because it is 1.6 standard deviations above the mean, which is under 2 standard deviations, making it usual.

7. According to a survey, 35% of people are left handed. If you randomly select 9 people, what is the probability that 6 of them are left handed? Is it likely that 7 people are left handed??

$n = 9, x = 6, p = 0.35, q = 0.65$

$$P(6) = \frac{9!}{6!(9-6)!} \cdot (0.35)^6 (0.65)^3 = 0.0424 \rightarrow 4.24\%$$ chance that out of 9 people, six are left handed.

- It is ~~unlikely~~ unlikely that 7 people are left handed because...

$$P(7) = \frac{9!}{7!(9-7)!}(0.35)^7(0.65)^2 = 0.00979$$ is less than $p < 0.05$.

8. A survey was conducted. 104 students stated they commute to school, and 297 stated they dorm. If one student is selected, what is the probability that they dorm.

~~$n = 401, x = 297\ p = 0.741\ \ q = 0.259$~~

$n = 401$ $\qquad \dfrac{297}{401} = 0.741$

9. The final consists of 75 true/false questions. Assume that an unprepared student makes random guesses for each of the answers.

Calculate the mean and standard deviation for the number of correct answers for each student.

$n = 75 \quad p = 0.50, \ q = 0.50$

$\mu = n \cdot p = 75(0.50) = 37.5$

$\sigma = \sqrt{npq} = \sqrt{(75)(0.50)(0.50)} = 4.3$

Would it be unusual for a student to pass this exam by guessing and getting at least 45 correct answers? Why or why not?

28.9   33.2   37.5   41.8   46.1

It would NOT be unusual because 45 falls within 2 standard deviations.

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$S=\frac{102-1}{4}=25.25$

Worksheet #5

1. Given the following data, estimate the standard deviation: $\bar{x}=39.15$

1 3 6 12 19 25 28 36 42 58 78 99 102

$\Sigma x=1+3+6+12+19+25+28+36+42+58+78+99+102=509$

$\Sigma x^2=34{,}673$ $n=13$ $s=\sqrt{\frac{13(34{,}673)-(509)^2}{13(12)}}=35.1$

2. What percentage of data falls within 1 standard deviation of the mean?

68%

3. What percentage of data falls within 2 standard deviations of the mean?

95%

4. Given the following data, find the z-score for the value of 14

$\Sigma x=124$ 1 6 14 19 24 29 31 $z=\frac{x-\bar{x}}{s}$ $z=\frac{14-17.7}{11.4}=-0.32$

$n=7$ $\bar{x}=\frac{124}{7}=17.7$ $s=\sqrt{\frac{7(2972)-(124)^2}{7(6)}}=11.4$

$\Sigma x^2=2972$

5.

23 95 83 42 18 4 25 39 48 18 94 82 14 17 21 5

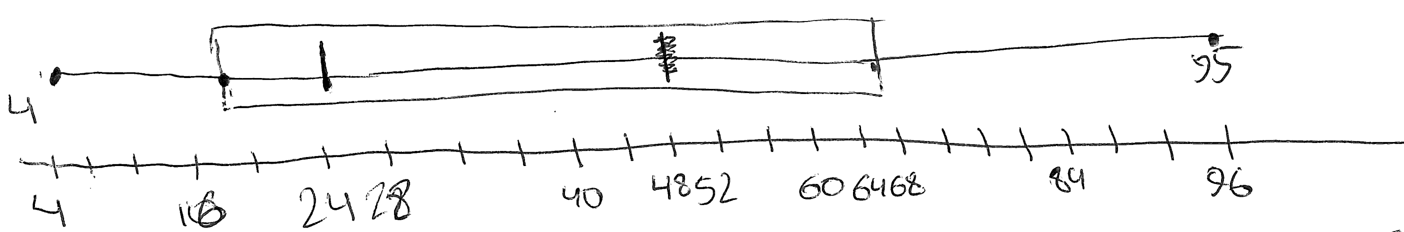
Construct the 5-number summary:

$Q_1=P_{25}$ $L=\frac{25}{100}\times 16=4$ $Q_2=P_{50}$ $L=\frac{50}{100}\times 16=8$

4, 5, 14, 17, 18, 18, 21, 23, 25, 39, 42, 48, 82, 83, 94, 95 $Q_3=P_{75}$ $L=\frac{75}{100}\times 16=12$

min = 4, max = 95, $Q_1=17.5$, $Q_2=24$, $Q_3=65$ 5-Number Summary = {4, 17.5, 24, 65, 95}

Construct a boxplot:



$IQR=Q_3-Q_1=65-17.5=47.5$ $LF=17.5-1.5(47.5)=-53.75$

$UF=65+1.5(47.5)=136.25$

outliers

$\bar{x}-2 \quad \bar{x}-1 \quad x$ $\qquad -2.1$

6. If the mean is 52, and the standard deviation is 14, what is the z score of 43? Is this usual or unusual?

$$z = \frac{x-\bar{x}}{s} = \frac{43-52}{14} = -0.64 \text{ S.D. below mean}$$

7. given the following data, find P_{40}

2 5 11 16 3 23 15 8 3 4 12 32 21

P_{40} $\quad L = \frac{40}{100} \times 13 = 5.2 \uparrow$ 6th number

2, 3, 3, 4, 5, 8, 11, 12, 15, 16, 21, 23, 32

$P_{40} = 8$

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Worksheet #4

1. For the x-axis of histograms, you should use the class boundaries.

2. For a frequency polygon, you use the class midpoints and graph the data from the frequency distribution.

3. For an ogive, you graph the class boundaries on the x-axis and the cumulative frequencies on the y-axis.

4. Using the following data, calculate the **mean, variance,** and **standard deviation.**

AGE	FREQUENCY	x=class midpoints	f·x
30 - 39	12	34.5	414^2
40 - 49	17	44.5	756.5^2
50 – 59	9	54.5	490.5^2
60 – 69	7	64.5	451.5^2
70 – 79	2	74.5	149^2
80 – 89	3	84.5	253.5^2

$\Sigma f x = 2515$

$\bar{X} = \frac{2515}{50} = 50.3$ years

$\Sigma x = \Sigma f \cdot x$

$s^2 = \frac{50(\cancel{6325225}\ (1274594)) - (2515)^2}{50(50-1)} = 23430.4 \text{ years}^2$

$s = 153.1$ years

5. 1. Given the following data, calculate the **mean** and **standard deviation**:

1 3 6 12 19 25 28 36 42 58 78 99 102

$\bar{X} = \frac{1+3+6+12+19+25+28+36+42+58+78+99+102}{13} = 39.2$

σ

$\Sigma x = 509$

$\Sigma x^2 = 1^2+3^2+6^2+12^2+19^2+25^2+28^2+36^2+42^2+58^2+78^2+99^2+102^2 = 34673$

$s = \sqrt{\frac{13(34673) - (509)^2}{13(13-1)}} = 35.1$

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Work Sheet #3

Directions: Fill in and answer all parts. Show all your work *neatly* please. ☺

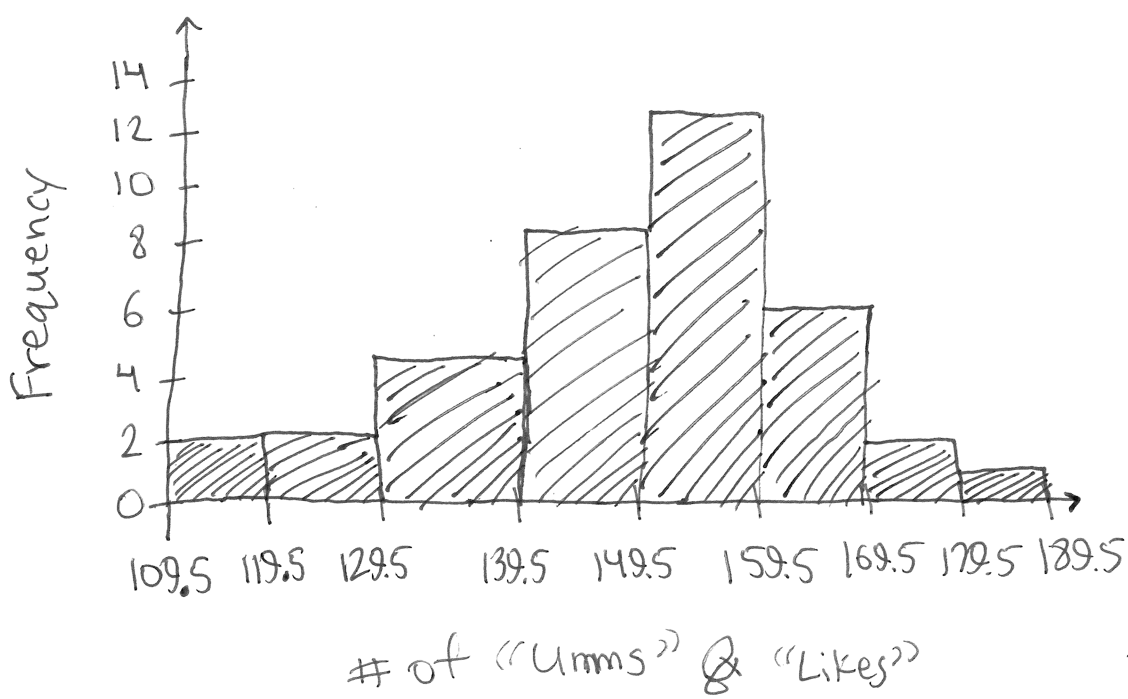
1. Listed below are the amount of times 40 college students said "Umm" and "like" in a 45 minute presentation. Construct a frequency distribution of the data with **eight classes**. Begin with a **lower class limit of 110**, and use a **class width of 10**. Include the **class boundaries, class midpoints, relative frequency,** and **cumulative frequency**.

155 142 149 130 151 163 151 142 156 133 138 161 128 144 172 137 151 166 147 163
145 116 136 158 114 165 169 145 150 150 150 158 151 145 152 140 170 129 188 156

# of "Umms" & "Likes"	Frequency	Cumulative Frequency	Relative Frequency	Class Midpoints	Class Boundaries	Degree
110-119	2	2	0.05	114.5	109.5, 119.5	18°
120-129	2	4	0.05	124.5	129.5	18°
130-139	5	9	0.125	134.5	139.5	45°
140-149	9	18	0.225	144.5	149.5	81°
150-159	13	31	0.325	154.5	159.5	117°
160-169	6	37	0.15	164.5	169.5	54°
170-179	2	39	0.05	174.5	179.5	18°
180-189	1	40	0.025	184.5	189.5	9°

Directions: For numbers 2 & 3, **label** and **scale** graphs properly for credit.

2. Construct a **Frequency Histogram**



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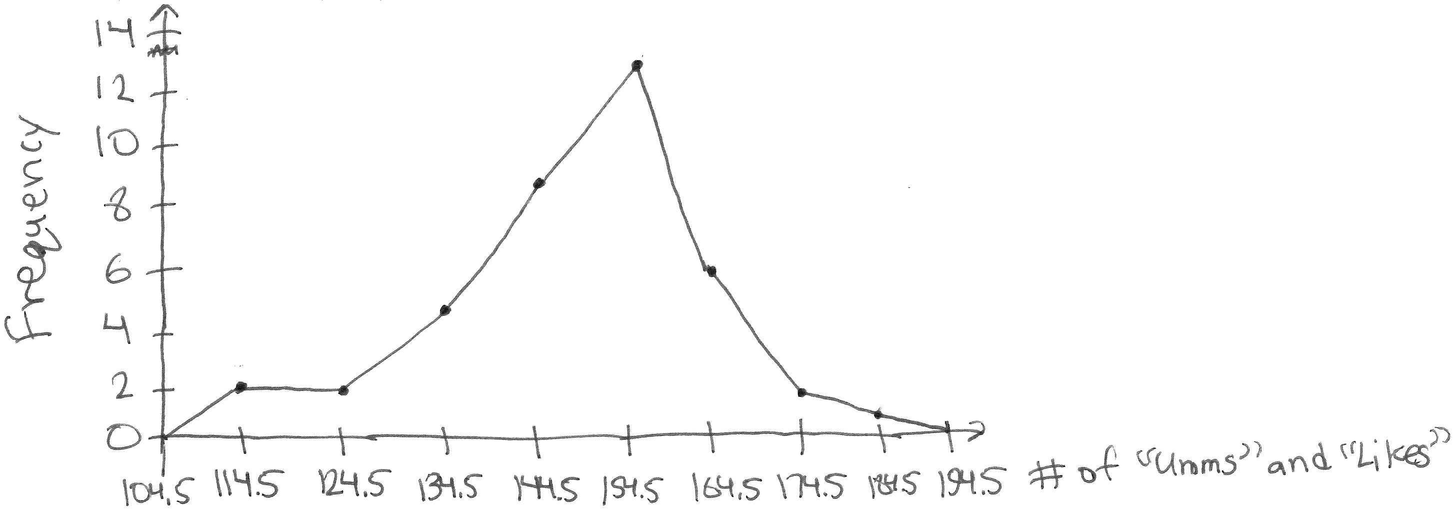
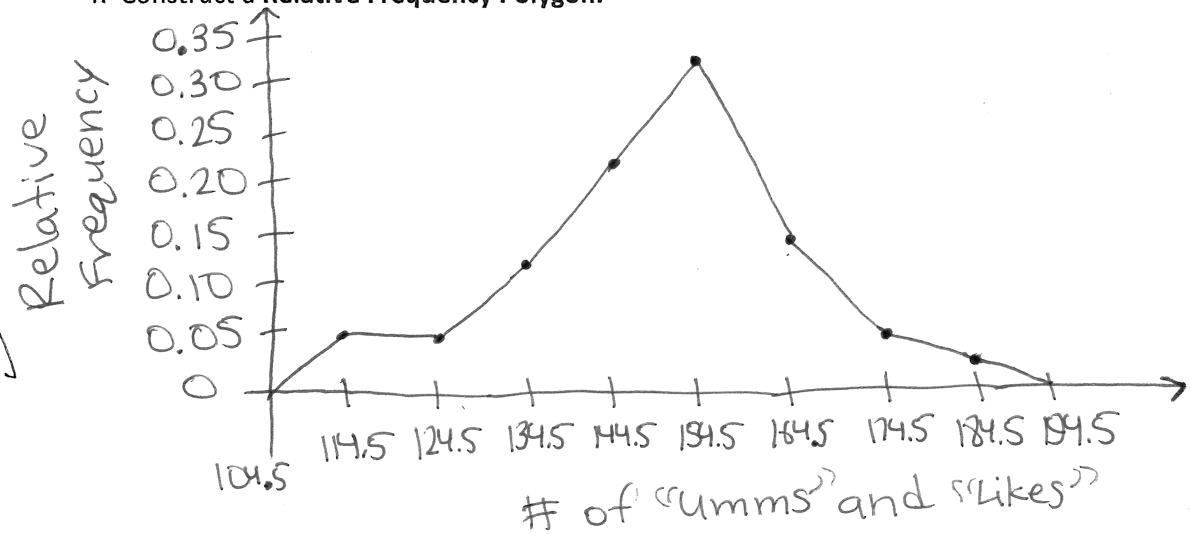
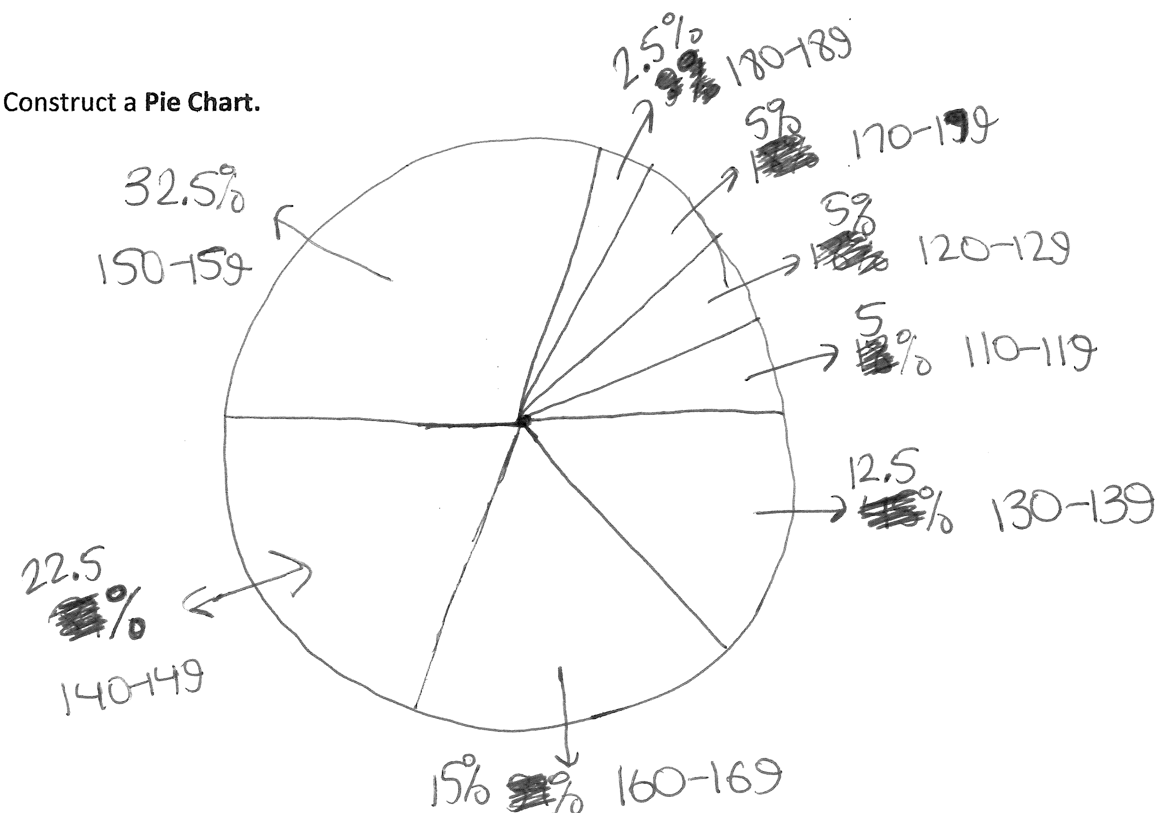
3. Construct a **Frequency Polygon**



4. Construct a **Relative Frequency Polygon.**



5. Construct a **Pie Chart.**



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Worksheet #2

Consider the amount of students obtained from a random sample of 40 classrooms.
76 72 88 60 72 68 80 64 68 68 80 76 68 72 96 72 68 72 64 80
64 80 76 76 76 80 104 88 60 76 72 72 88 80 60 72 88 88 124 64

Organize the data from least to greatest.

60, 60, 60, 64, 64, 64, 64, 68, 68, 68, 68, 68, 72, 72, 72, 72, 72, 72, 72, 72, 76, 76, 76,
76, 76, 76, 80, 80, 80, 80, 80, 88, 88, 88, 88, 88, 96, 104, 124
80

Using 7 classes, what is the class width? List the classes.

$\frac{124-60}{7} = \frac{64}{7} \approx 9.1 \; 10$

60-69
70-79
80-89
90-99
100-109
110-119
120-129

Construct a frequency distribution.

Students	Frequency
60-69	~~3~~ 12
70-79	14
80-89	11
90-99	1
100-109	1
110-119	0
120-129	1

Construct a cumulative frequency distribution.

Students	Cum. Frequency
Less than 70	12
Less than 80	26
Less than 90	37
Less than 100	38
Less than 110	39
Less than 120	39
Less than 130	40

Construct a relative frequency distribution.

Students	Relative Frequency Distribution
60-69	30%
70-79	35%
80-89	27.5%
90-99	2.5%
100-109	2.5%
110-119	0%
120-129	2.5%

Construct a relative cumulative frequency distribution.

Students	Relative Cum. Frequency
Less than 70	30%
Less than 80	65%
Less than 90	92.5%
Less than 100	95%
Less than 110	97.5%
Less than 120	97.5%
Less than 130	100%

Construct a relative frequency histogram.

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Worksheet #1

1. Data: collections of observations

2. Statistics: the science of planning studies and experiments, obtaining data, and then organizing, summarizing, presenting, analyzing, interpreting, and drawing collections based on the data

3. population: the complete collection of all individuals to be studied

4. Sample: subcollection of members selected from a population

5. parameter: numerical measurement describing some characteristic of a population

6. Statistic: numerical measurement describing some characteristic of a sample

7. Give an example of **quantitative data:**

Age, Height

8. Give an example of **qualitative (categorical) data:**

phone number, skin color, gender

9. What is the difference between **discrete** and **continuous** daa? Give an example of each.

Discrete is countable, whereas continuous is measured.
Discrete – number of cars, class size.
Continuous – height, weight, temperature, distance.

NAME ____________________

1. A(n) ________ is obtained by dividing the population into groups and selecting all individuals from within a random sample of the groups.

a. Simple Random Sample (SRS)

b. Systematic Sample

c. Cluster Sample

d. Stratified Sample

2. A(n) ________ is obtained by dividing the population into homogeneous groups and randomly selecting individuals from each group.

a. Simple Random Sample (SRS)

b. Systematic Sample

c. Cluster Sample

d. Stratified Sample

3. Identify the type of sampling used.
To estimate the percentage of defects in a recent manufacturing batch, a quality-control manager at Intel selects every 8th chip that comes off the assembly line starting with the 3rd until she obtains a sample of 140 chips.

a. Simple Random Sample (SRS)

b. Systematic Sample

c. Cluster Sample

d. Stratified Sample

4. Dylan can't decide where to go on vacation. His choices are Florida, Hawaii, and Paris. He has a brochure of each vacation spot. He places the brochures in a bag, shakes the bag, closes his eyes, and picks out one of the brochures. Is the sample that he surveyed a cluster sample or simple random sample? simple random sample

5. Marcie wanted to find out how many people enjoyed the new romancecomedy that came out this weekend. On Saturday, Marcie stood outside of the theater showing the movie and asked every 5th person whether or not they liked the movie. Is the sample that she surveyed a simple random sample or a systematic sample?

systematic sample

6. Identify which of these types of sampling is used: A. simple random, B. systematic, C. stratified, or D. cluster.

a) The Gallup Organization plans to conduct a poll of New York City residents. Computers are used to randomly generate telephone numbers that are automatically called. A

b) A marketing expert for MTV is planning a survey in which 500 people will be randomly selected from each age group, 10-19, 20-29, and so on. C

c) A Johns Hopkins University researcher surveys all cardiac patients in each of 30 randomly selected hospitals. D

d) A U.S. customs agent pulls over and inspects the cars of every 125th car that passes through the Detroit-Windsor tunnel. B

e) A General Motors researcher has partitioned all registered cars into categories of subcompact, compact, mid-size, intermediate, and full-size. She is surveying 200 randomly selected car owners from each category. C

f) The College of Newport conducts a study of student drinking by randomly selecting 10 different classes and interviewing all of the students. D

7. Think of your own example for each of the following:

Two (or more) Stage Sample:

Simple Random Sample:

Putting people's name in a hat, shaking it, and then choosing one.

Stratified Random Sample:

~~Divide~~ Survey (randomly) people from different incomes.

Cluster Sample:

Choose two random biology classes from all the classes in college and interview all of the students in that class.

$p > \cancel{80}\, 0.80$

NAME Aleksandr Gorokhov

#15

Worksheet #~~12~~

$n = 224\cancel{8}6$

$P_0 = 0.80$

$P_1 > 0.80$

RT

$p = 0.8$

$\alpha = 0.05$

1. In a survey of 2246 people, 1864 adults said that texting while driving should be illegal. Consider a hypothesis test that uses a 0.05 significance level to test the claim that more than 80% of adults believe that texting while driving should be legal.

$1 - \alpha = 0.05 \quad \alpha = 0.95 \quad q = 0.2$

a. What is the critical value?

$z = 1.645$

$\hat{p} = \frac{1864}{2246} = 0.83 \qquad z = \frac{0.83 - 0.8}{\sqrt{\frac{(0.80)(0.2)}{2246}}} = 3.55 \qquad \cancel{z = 0.84}$

b. What is the test statistic?

$z = 3.55$

c. What is the P-value?

$1 - 0.9999 = 0.0001$

d. Is the P-value less than, or greater than, alpha?

$0.0001 < 0.05$

less than → reject Ho

e. What is the conclusion?

The sample data supports the claim that more than 80% of adults believe that texting while driving should be legal.

2. Among 300 surveyed adults, 27 said they don't like pizza. Use a 0.05 significance level to test the claim that less than 10% of adults don't like pizza. What is your conclusion?

$\alpha = 0.05, \quad H: p < 0.10$

$H_0: p = 0.10$

$H_1: p < 0.10$

LT

$\hat{p} = \frac{27}{300} = 0.09$

Critical value:

$z = -1.645$ Fail to reject Ho

Test Stat: -5.77 -1.645 CV -0.577

test statistic:

$z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} = \frac{0.09 - 0.10}{\sqrt{\frac{(0.10)(0.90)}{300}}} = -0.578 \quad \cancel{-5.77}$

0.2810

p-value: ~~1 − 0.0001 = 0.9999~~ [illegible]

$0.2810 > 0.05$

$0.\cancel{0001} < 0.05$, ~~fail to~~ fail to reject Ho.

I.C. fail to reject Ho.

F.C. There is sufficient sample data evidence to support the claim that [illegible] significance level

$\hat{p}$

3. 21,346 people were asked if they believe the Lock Ness monster exists. 64% answered "yes." Use a 0.01 significance level to test to test the claim that most people believe that the Lock Ness monster exists.

$\alpha = 0.01$ ~~p=0.64~~ ~~p=0.64~~ ~~$H_1: p \neq 0.64$~~ ~~$\alpha = 0.01$~~ $\alpha = 0.01$

~~$\frac{\alpha}{2} = 0.005$~~

~~$z_{\alpha/2} = 2.575$~~

$\hat{p} = 0.64$

$H: p > 0.50$

$H_0: p = 0.50$

$H_1: p > 0.50$

RT

$$z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} = \frac{0.64 - 0.50}{\sqrt{\frac{(0.5)(0.5)}{21{,}346}}} = 40.9$$

$1 - 0.9999 = 0.0001$

$0.0001 < 0.01$, reject Ho

The sample data supports the claim that ~~most people believe that the Lock Ness monster exists.~~ $p > 0.5$ at 5% significance value.

4. This year, a town experienced an arrest rate of 25% for robberies. The new sheriff's records show that among 30 recent robberies, the arrest rate is 30%, so she claims that her arrest rate is greater than the 25% rate in the past. Is there sufficient evidence to support her claim that the arrest rate is greater than 25%?

$\hat{p} = 0.30$

$p = 0.25$

$$z = \frac{0.30 - 0.25}{\sqrt{\frac{(0.25)(0.75)}{30}}} = 0.63$$

claim: $p > 0.25$

$H_0: p = 0.25$

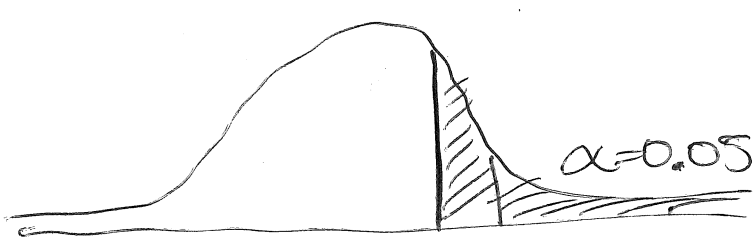
$H_1: p > 0.25$

RT

0.7357

p-value: $1 - 0.7357 = 0.2643$

$0.2643 > 0.05$, fail to reject Ho



Test Stat: $z = 0.63$

1.645 CV

There is not sufficient sample data evidence to support the claim that $p > 0.25$ at 5% significant level.

NAME Aleksandr Gorokhov

Worksheet 14
Review for Test #2

1. The weights of men are normally distributed with a mean of 159 (μ) and a standard deviation of 26 lb. (σ)

a. If one man is randomly selected, what is the probability that his weight is between 155 and 180?

$$P\left(\frac{155-159}{26} < x < \frac{180-159}{26}\right) = P(-0.15 < z < 0.81) = 0.7910 - 0.4404 = 0.3506$$

35.06%

b. If 35 different men are randomly selected, what is the probability that their mean weight is between 155 and 180?

$$P\left(\frac{155-159}{26/\sqrt{35}} < z < \frac{180-159}{26/\sqrt{35}}\right) = P(-0.91 < z < 4.78) = 0.9999 - 0.1814 = 0.8185$$

81.85%

2. In a survey of 1000 randomly selected people, 607 of them said they voted in the last presidential election. $n = 1000$, $\hat{p} = 0.607$, $\hat{q} = 0.393$

Find a 99% confidence interval estimate of the proportion of people who say that they voted. **Interpret your result.** $1-\alpha = 0.99$ $\alpha = 0.01$ $\frac{\alpha}{2} = 0.005$, $z_{\frac{\alpha}{2}} = 2.575$

$$E = (2.575)\sqrt{\frac{(0.607)(0.393)}{1000}} = \cancel{0.040}\ 0.0398$$

$$0.607 - 0.0398 < p < 0.607 + 0.0398$$

$$0.567 < p < 0.647$$

99% chance that our population proportion is between 0.567 and 0.647.

3. How many randomly selected adults must be surveyed to estimate the percentage of adults that use the Internet? Assume that it is estimated that 82% of adults use the Internet. Also, assume that we want to be 99% confident that the sample percentage falls within two points of the true population percentage.

$E = 0.02$, $\hat{p} = 0.82$, $\hat{q} = 1 - 0.82 = 0.18$ $z_{\frac{\alpha}{2}} = 2.575$

$$n = \frac{(2.575)^2(0.82)(0.18)}{(0.02)^2} = 2{,}446.7 \rightarrow 2{,}447 \text{ adults}$$

4. A simple random sample of 50 CSUN students has a mean weight of 152 and a standard deviation of 18 lb. Find a 95% confidence interval estimate of the mean weight of all CSUN students. What does this confidence interval tell us?

$n=50, \bar{x}=152lb, s=18lb. \quad 1-\alpha=0.95 \quad \alpha=0.05 \quad \frac{\alpha}{2}=0.0250 \rightarrow$

$df=49 \quad t_{\frac{\alpha}{2}}=1.984$

$E=(1.984)\left(\frac{18}{\sqrt{50}}\right)=5.1$

$152lb-5.1 < \mu < 152lb.+5.1$

$146.9lb. < \mu < 157.1lb.$

95% chance that population mean weight is between 146.9lb. and 157.1lb.

5. A simple random sample of 50 CSUN students has a mean weight of 152. The standard deviation of the weights of all CSUN students is 15 lb. Find a 95% confidence interval estimate of the mean weight of all CSUN students. What does this confidence interval tell us?

$n=50, \mu=152lb, \sigma=15lb. \quad 1-\alpha=0.95 \quad \alpha=0.05 \quad \frac{\alpha}{2}=0.025$

$z_{\frac{\alpha}{2}}=1.96$

$E=(1.96)\left(\frac{15}{\sqrt{50}}\right)=4.2$

$152lb.-4.2 < \mu < 152lb.+4.2$

$147.8lb. < \mu < 156.2lb.$

95% chance that our population mean weight is between 147.8lb. and 156.2lb.

6. What sample size is needed to estimate the mean white blood cell count for the population of adults in the U.S.? Assume that you want to be 99% confident that the sample mean is within 0.2 of the population mean. The population standard deviation is 2.5.

$E=0.2, \sigma=2.5, 1-\alpha=0.99 \quad \alpha=0.01 \quad \frac{\alpha}{2}=0.005$

$z_{\frac{\alpha}{2}}=2.575$

$n=\left(\frac{2.575\times 2.5}{0.2}\right)^2=1036.035156 \rightarrow \boxed{1037 \text{ adults}}$

7. The listed values are times (in minutes) students spent looking for parking.

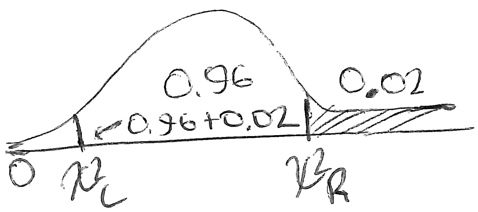
6.5 4.6 6.7 8.2 6.8 7.1 7.3 7.4 7.7 9.1 5.7 7.7

Construct a 96% confidence interval for the population standard deviation of the amount of time they spent looking for parking.

$\bar{x} = 7.07 \quad s = 1.16 \quad n = 12 \quad df = 12 - 1 = 11$

$1 - \alpha = 0.96 \quad \alpha = 0.04 \quad \frac{\alpha}{2} = 0.02$

df	0.985	0.025
11	→ 3.816 χ^2_L	→ 21.920 χ^2_R



$\chi^2_L = 0.98$

$\chi^2_R = 0.02$

$$\frac{(12-1)(1.16)^2}{21.920} < \sigma^2 < \frac{(12-1)(1.16)^2}{3.816}$$

$$0.6752554745 < \sigma^2 < 3.878825996$$

$$0.82\,\text{min} < \sigma < 1.97\,\text{min.}$$

96% chance that our population standard deviation is between 0.82 min. and 1.97 min.

NAME Aleksandr Gorokhov

Worksheet #13

1. The listed values are waiting times (in minutes) of customers at In-N-Out.

6.5 6.6 6.7 6.8 7.1 7.3 7.4 7.7 7.7 7.7

Construct a 95% confidence interval for the population standard deviation.

$\bar{x}=7.15 \quad s=0.477 \quad n=10 \quad 1-\alpha=0.95 \quad \alpha=0.05$

~~1.96~~

~~$E=2.262\left(\frac{0.477}{\sqrt{10}}\right)$~~ ~~0.341~~ ~~0.296~~ $df=9 \quad \frac{\alpha}{2}=0.025$

~~$7.15-0.341<\mu<7.15+0.341$~~

~~$6.809<\mu<7.491$~~

~~$6.854<\mu<7.446$~~

$\chi^2_R=19.023$

$\chi^2_L=2.700$

$$\frac{9(0.477)^2}{19.023}<\sigma^2<\frac{9(0.477)^2}{2.700}$$

$0.11<\sigma^2<0.76$

$0.33<\sigma<0.87$

2. 100 M&M's are weighed. The minimum weight is .696 g and the maximum weight is 1.015 g.

a. Use the range rule of thumb to estimate sigma, the standard deviation of all M&M's.

$$s=\frac{1.015-0.696}{4}=0.07975$$

b. The 100 weights have standard deviation of 0.0518 g. Construct a 95% confidence interval estimate of the standard deviation of all M&Ms. DON'T FORGET TO STATE YOUR CONCLUSION.

$n=100 \quad 1-\alpha=0.95 \quad \alpha=0.05 \quad \frac{\alpha}{2}=0.025$

$s=0.0518 \quad df=100-1=99 \quad \chi^2_R=129.561$

$$\frac{99(0.0518)^2}{129.561}<\sigma^2<\frac{99(0.0518)^2}{74.222} \quad \chi^2_L=74.222$$

$0.00205031<\sigma^2<0.00357900$

$0.0453<\sigma<0.0598$

c. Does the confidence interval include the estimated value of sigma from part a? What does this suggest?

No, the confidence interval does NOT include the estimated value of sigma from part A. This suggests that using the range rule of thumb is inaccurate.

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NAME Aleksandr Gorokhov

Worksheet #8

Assume we have a standard normal distribution, with a mean of 0 and standard deviation of 1.

Find the probabilities for the following cases:

1. less than 2.36

$p = 0.9909$

2. greater than 3.21

$p = 0.0007$

3. less than -1.43

$p = 0.0764$

4. between -.04 and -1.12

$p = 0.4840 - 0.1314 = 0.3526$

5. greater than -.26

$p = 1 - 0.3974 = \cancel{0.6406}$ 0.6026

6. between -2.87 and 1.34

$p = 0.9099 - 0.0021 = 0.9078$

Find the indicated value:

7. $z_{.10}$ $z = 1.28$

8. $z_{.02}$ $z = 2.05$?

Find the indicated probability:

9. P(-1.06 < z < 1.06)

~~P = 0.8554 - 0.1446 = 0.7108~~ $P = 0.8554 - 0.1446 = 0.7108$

10. P(z < 1.23)

$P = 0.8907$

11. The U.S. Army requires women's heights to be between 58 in. and 80 in.

Find the percentage of women meeting the height requirement. $z > -1$

$\mu = 64$
$\sigma = 6$

$P\left(\frac{58-64}{6} < z < \frac{80-64}{6}\right) = P(-1 < z < 2.67)$

$= \cancel{0.1587 -} \cancel{0.1587 - 0.9962}\ 0.9962 - 0.1587 = 0.8375$

What percentage of women are less than 55 in. tall?

83.75% would fit the height requirement

$z = \frac{55-64}{6} = -1.5$

$P(z < -1.5) = 0.0668$

6.68% of women are less than 55 in. tall

NAME Aleksandr Gorokhov

Worksheet #12

Determine if you would use the z-table, or t-table for the following:

1. Randomly selected students were selected to participate in an experiment to test their ability to determine when 1 minute has passed. Forty students yielded a sample mean of 58.3 sec. Assume that $\sigma = 9.5$ sec. Construct a 95% confidence interval of the population mean of all students.

z-table

2. The ages of the 79 actresses at the time that they won Oscars for the Best Actress category have a mean of 35.8 years and a standard deviation of 11.3 years. Construct a 99% confidence interval of the mean age of actresses at the time they win Oscars for the Best Actress Category.

t-table

3. Listed below are twelve lengths (in minutes) of randomly selected movies.
110 96 125 94 132 120 136 154 149 94 119 132
Construct a 99% confidence interval of the mean length of all movies.

t-table

4. A simple random sample of 75 birth weights in the U.S. has a mean of 3433 g. The standard deviation of all birth weights is 495 g. Construct a 95% confidence interval estimate of the mean birth weight in the United States.

z-table

5. A random sample of 106 body temperatures found that the mean was 98.2°F and $s =$ .62°F. Construct a 99% confidence interval of the mean body temperature of all human beings.

t-table

6. In a survey of 1002 people, 701 said that they voted in a recent presidential election. Voting records show that 61% of eligible voters actually did vote. Find a 99% confidence interval estimate of the proportion of people who say that they voted.

z-table

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NAME Aleksandr Gorokhov

Worksheet #21
QUIZ

1. Listed below are the amounts (in dollars) college students spend on food weekly. Use a 0.01 significance level to test the claim that seniors spend less money on food than freshman.

Seniors:	25	14	22	18	24	15	23
Freshman:	24	26	34	28	17	18	20
d	1	-12	-12	-10	7	-3	3

$\alpha = 0.01$

claim: $\mu_d < 0$

$H_0: \mu_d = 0$

$H_1: \mu_d < 0$ LT

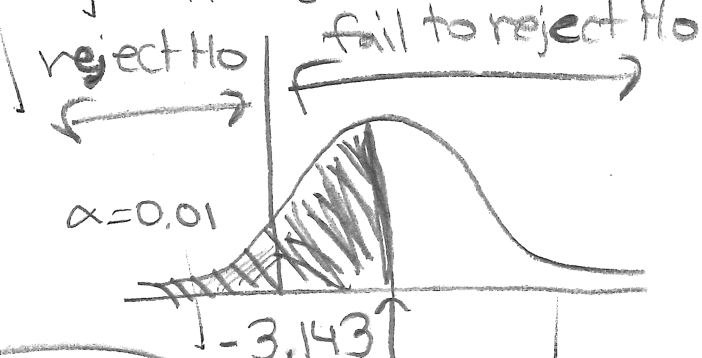
$\bar{d} = -3.7$

$n = 7$, $df = 6$

$s_d = 7.7$

Test stat:

$t = \dfrac{-3.7}{\frac{7.7}{\sqrt{7}}} = \boxed{-1.271}$



CV=-3.143

Test stat: $t = -1.271$

I.C.
Fail to reject Ho.

p-value > 0.10 > 0.01 = α, fail to reject Ho

F.C.
There is not sufficient sample data evidence to support the claim that seniors spend less money on food than freshman ($\mu_d < 0$) at 1% significant level.

10/10

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Worksheet #16

1. Randomly selected men were asked if they agree with the statement that "It is morally wrong for married people to have an affair." Among the 386 [redacted]men surveyed, 347 agreed. Use a 0.05 significance level to test the claim that most men agree with this statement.

$\alpha=0.05$, $n=386$, $x=347$

claim: $p>0.50$

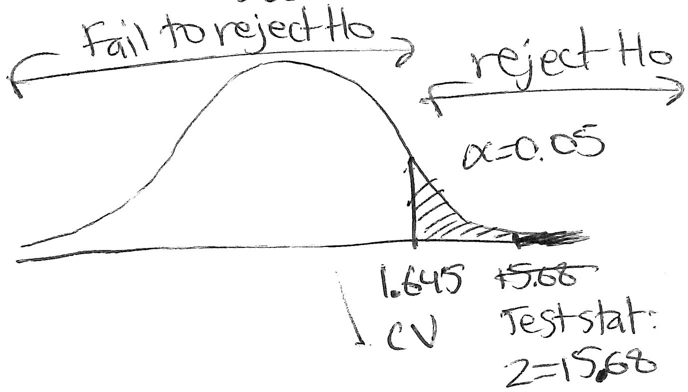
$H_0: p=0.50$

$H_1: p>0.50$ RT

$\hat{p}=\frac{347}{386}=0.899$

Test statistic:

$$z=\frac{0.899-0.50}{\sqrt{\frac{0.50\times0.50}{386}}}=15.68$$



p-value: $1-0.9999=0.0001$

$0.0001<0.05$ reject Ho

Initial conclusion:

Reject Ho

Final Conclusion

There is sufficient sample data evidence to supports the claim that $p>0.50$ at 5% significance level.

NAME Aleksandr Gorokhov

Worksheet # ~~14~~ #18

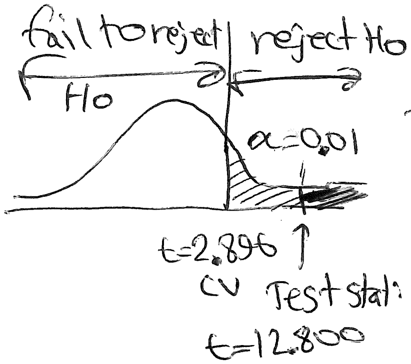
1. The heights of nine women basketball players were measured. They have a mean height of 70.0 in. and a standard deviation of 1.5 in. Use a 0.01 significance level to test the claim that women basketball players have heights with a mean that is greater than the mean height of 63.6 in. for women in the general population.

$\bar{x}=70.0$ in.
$s=1.5$ in.
$n=9$
$df=8$

Claim: $\mu > 63.6$ in.

H_0: $\mu = 63.6$ in. $\alpha = 0.01$

H_1: $\mu > 63.6$ in. (RT)



Test statistic:

$t = \frac{\bar{x}-\mu}{\frac{s}{\sqrt{n}}} = \frac{70.0-63.6}{\frac{1.5}{\sqrt{9}}} = 12.800$

Critical value(s):

CV: $t=2.896$

p-value:

P-Value $< 0.005 < 0.01 = \alpha$, reject Ho

I.C. :

Reject Ho.

F.C. :

There is sufficient sample data evidence to support the claim that $\mu > 63.6$ in at 1% signifiant level.

2. 40 people used Herbalife for one year. Their mean weight loss was 3.0 lb and the standard deviation was 4.9 lb. Use a 0.01 significance level to test the claim that the mean weight loss is greater than ~~0~~ ~~lb~~. 5 lb.

$n=40$
$\bar{x}=3.0$ lb.
$s=4.9$ lb.
$df=39$

Claim: $\mu > 0$ lb.
Ho: $\mu = 0$ lb.
H_1: $\mu > 0$ lb. (RT)

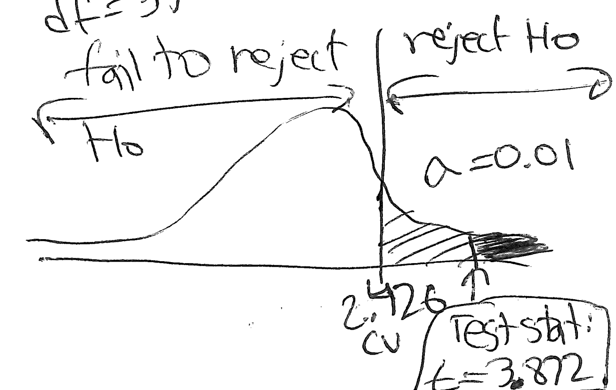
$\alpha=0.01$

p-value $< 0.005 < 0.01 = \alpha$, reject Ho

Test stat:

$t = \frac{3.0-\cancel{4.9}\,0}{\frac{4.9}{\sqrt{40}}} = 3.872$

(CV=2.426)



I.C.
Reject Ho.

F.C.
There is ~~a~~ sufficient sample data evidence to support the claim that $\mu > 0$ lb. at 1% significant level.

3.A simple random sample of pages from a book is listed below. Use a 0.05 significance level to test the claim that the mean number of words on a page is less than 88.0.

70 84 120 156 82 93 112 68 91

claim: $\mu < 88.0$ in.

H_0: $\mu = 88.0$ in.

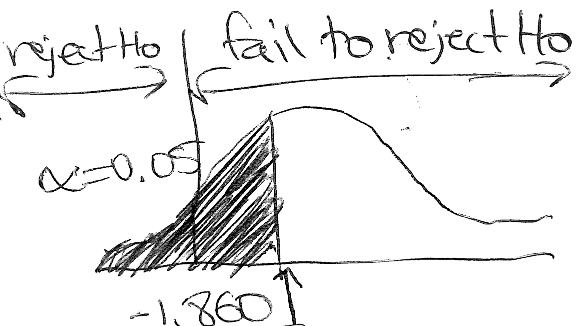
H_1: $\mu < 88.0$ in. LT

$\bar{x} = 97.3$

$s = 27.95$

$\alpha = 0.05$ $n = 9$

$df = 8$



Test stat: $t = 0.998$

CV: $t = -1.860$

Test stat:

$$t = \frac{97.3 - 88.0}{\frac{27.95}{\sqrt{9}}} = 0.998$$

p-value $> 0.10 > 0.05 = \alpha$, fail to reject Ho

I.C.

Fail to reject Ho.

F.C.

There is not sufficient sample data evidence to support the claim that $\mu < 88.0$ in. at 5% significant level.

NAME Aleksandr Gorokhov

Worksheet #19

1. A simple random sample of 40 children results in a standard deviation of 11.3 beats per minute. The normal range of pulse rates is typically 60 to 100 beats per minute. The range rule of thumb results in a standard deviation of 10 beats per minute. Use the sample results with a 0.05 significance level to test the claim that pulse rates of children have a standard deviation greater than 10 beats per minute.

$n=40$, $s = 11.3$ beats/min. df = 39

Claim: $\sigma > 10$ beats/min

Ho: $\sigma = 10$ beats/min $\alpha = 0.05$

H_1: $\sigma > 10$ beats/min (RT)

$$\chi^2 = \frac{(40-1)(11.3)^2}{(10)^2} = 49.799$$

I. C.
Fail to reject Ho. p-value > 0.10 > 0.05 = α, fail to reject Ho.

F. C. There is not sufficient sample data evidence to support the claim that $\sigma > 10$ beats/min at 5% significant level.

2. Tests in a history class have a standard deviation equal to 14.1. In the last class the 27 test scores has a standard deviation of 9.3. Use a 0.01 significance level to test the claim that this class has less variation than past classes. Does a lower standard deviation suggest that this last class is doing better?

Claim: $\sigma_1 < \sigma_2$

Ho: $\sigma_1 = \sigma_2$

H: $\sigma_1 < \sigma_2$ (LT)

$n = 27$

df = 26 $\alpha = 0.01$

$\sigma = 14.1$

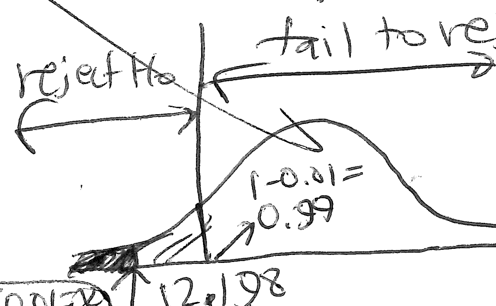
$s = 9.3$

$$\chi^2 = \frac{(27-1)(9.3)^2}{(14.1)^2} = 11.311$$

~~p-value < 0.005 > 0.01, fail to reject Ho~~

I. C
Reject Ho.

F. C.
There is sufficient sample data evidence to support the claim that $\sigma_1 < \sigma_2$ at 1% significant level.



0.01 < p-value < 0.005 < 0.01 = α
reject Ho

Test stat: $\chi^2 = 11.311$

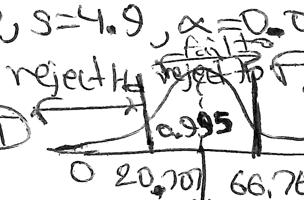
3. 40 people went on an all-vegetable diet and their weight losses had a standard deviation of 4.9 lb. Use a 0.01 significance level to test the claim that the amounts of weight loss have a standard deviation equal to 6.0 lb, which is the standard deviation of an all-fruit diet.

$n=40,\ s=4.9,\ \alpha=0.01$ $df=39$

Claim: $\sigma=6.0$ lb

$H_0: \sigma=6.0$ lb

$H_1: \sigma\neq 6.0$ lb (2T)



$\chi^2=26.011$

I.C.

Fail to reject Ho.

.05

p-value $> 0.025 > 0.01=\alpha$, fail to reject Ho

$0.05 < p\text{-value} < 0.10 > 0.$

Test stat: $\chi^2=26.011$

F.C.

There is not sufficient sample data evidence to support the claim that $\sigma=6.0$ lb at 1% significant level.

4. How do you calculate the test statistic for two proportions (with $H_0: p_1 = p_2$)?

$$z=\frac{(\hat{p}_1-\hat{p}_2)}{\sqrt{\frac{\bar{p}\bar{q}}{n_1}+\frac{\bar{p}\bar{q}}{n_2}}}$$

5. How do you calculate $\bar{p}$ and $\bar{q}$?

$$\bar{p}=\frac{x_1+x_2}{n_1+n_2} \qquad \bar{q}=1-\bar{p}$$

6. How do you calculate the confidence interval of the difference $p_1 - p_2$?

$$\hat{p}_1-\hat{p}_2-E < p_1-p_2 < \hat{p}_1-\hat{p}_2+E$$

7. How do you calculate the margin of error?

$$E=z_{\frac{\alpha}{2}}\sqrt{\frac{\hat{p}_1\hat{q}_1}{n_1}+\frac{\hat{p}_2\hat{q}_2}{n_2}}$$

8. A simple random sample of front-seat occupants involved in car crashes was obtained. Among 2823 occupants not wearing seatbelts, 31 were killed. Among 7765 individuals wearing seatbelts, 16 were killed. Construct a 90% confidence interval estimate of the difference between the fatality rates for those not wearing seat belts and those wearing seat belts. What does the result suggest about the effectiveness?

TG	PG
$n_1=2823$	$n_2=7765$
$x_1=31$	$x_2=16$
$\hat{p}_1=\frac{x}{n}=0.0110$	$\hat{p}_2=0.00206$
$\hat{q}_1=0.989$	$\hat{q}_2=0.998$

~~Claim:~~

~~Ho: $p_1=p_2$~~

~~H1:~~

$\frac{\alpha}{2}=0.05$

$1-\alpha=0.90$

$\alpha=0.10$

$$E=\cancel{1.28}\ 1.645\sqrt{\frac{(0.011)(0.989)}{2823}+\frac{(0.002)(0.998)}{7765}}$$

$E=0.0033$

$0.00584 < p_1-p_2 < 0.01224$

90% confidence that ~~our~~ the difference between p_1-p_2 falls between 0.00564 and 0.01224.

This ~~small~~ minimal difference shows that seat belts are not effective.

9. Using the same data from 8, use a 0.05 significance level to test the claim that the fatality rate is higher for those not wearing seat belts.

$\alpha = 0.05$

claim: $p_1 > p_2$

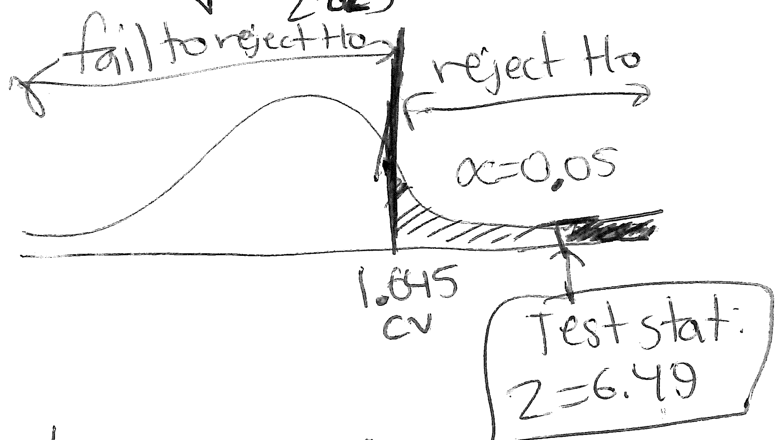
$H_0: p_1 = p_2$

$H_1: p_1 > p_2$ (RT)

$$\bar{p} = \frac{31+16}{2823+7765} = \frac{47}{10{,}588} = 0.004$$

$$\bar{q} = 1 - 0.004 = 0.996$$

$$z = \frac{(0.011 - 0.002)}{\sqrt{\frac{(0.004)(0.996)}{2823} + \frac{(0.004)(0.996)}{7765}}} = \cancel{0.00804}\ \ 6.49\ \ \cancel{0.5304}$$



p-value = 0.0001 < 0.05 = α,
reject Ho

I.C.
Reject Ho.

F.C.
There is sufficient sample data evidence to ~~sug~~ support the claim that $p_1 > p_2$ at 5% significant level.

NAME Aleksandr Gorokhov

Worksheet #20

1. Listed below are the costs (in dollars) of flights from LAX to Chicago. Use a 0.01 significance level to test the claim that flights scheduled one day in advance cost more than flights scheduled 30 days in advance.

$\alpha = 0.0$ claim: $\mu_d > 0$

$H_0: \mu_d = 0$

Flight scheduled one day in advance: 456 614 628 1088 943 567 536 $H_1: \mu_d > 0$ RT

Flight scheduled 30 days in advance: 244 260 264 264 278 318 280

d 212 354 364 824 665 249 256

$\bar{d} = 417.7$

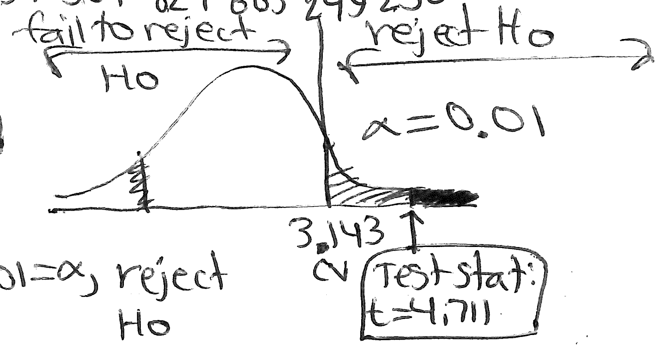
$n = 7$

$S_d = 234.6$

$df = 6$

Test stat:

$t = \dfrac{417.7}{\frac{234.6}{\sqrt{7}}} = \boxed{4.711}$



I.C.

Reject Ho p-value < 0.005 < 0.01 = α, reject Ho

F.C.

There is sufficient sample data evidence to support the claim that $\mu_d > 0$ at 1% significant level. (flights scheduled oneday in advance costs more than 30 days)

2. Randomly selected women and men were asked if they agree with the statement that "It is morally wrong for married people to have an affair." Among the 386 women surveyed, 347 agreed. Among 359 men surveyed, 305 agreed. Use a 0.05 significance level to test the claim that the percentage of women who agree is different than the percentage of men that agree.

claim: $p_1 \neq p_2$ $\alpha = 0.05$

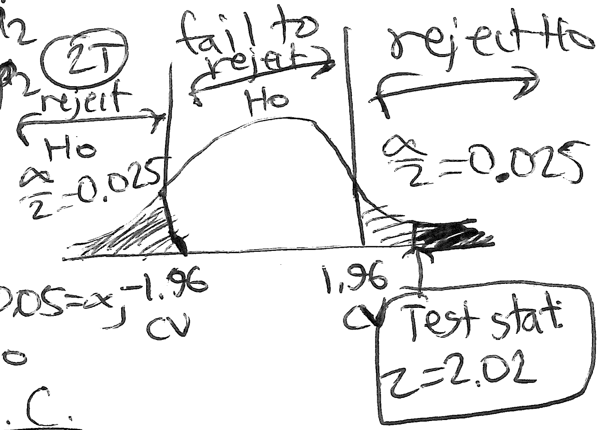
$H_0: p_1 = p_2$

$H_1: p_1 \neq p_2$ 2T

WG	MG
$n_1 = 386$	$n_2 = 359$
$x_1 = 347$	$x_2 = 305$
$\hat{p}_1 = 0.899$	$\hat{p}_2 = 0.850$

$\bar{p} = \dfrac{347+305}{386+359} = 0.875$

$\bar{q} = 1 - 0.875 = 0.125$



p-value = 0.0[illegible] < 0.05 = α, reject Ho

Test stat:

$z = \dfrac{(0.899)-(0.850)}{\sqrt{\dfrac{(0.875)(0.125)}{386} + \dfrac{(0.875)(0.125)}{359}}} = 2.02$

I.C.

Reject Ho.

F.C.

There is sufficient sample data evidence to support the claim that $\mu_1 \neq \mu_2$ at 5% significance level.

3. A random sample of 25 menthol cigarettes and 25 nonmenthol cigarettes was conducted. The menthol cigarettes had a mean nicotine amount of .87 mg and a standard deviation of .24 mg. The nonmenthol cigarettes had a mean nicotine amount of .92 mg and a standard deviation of .25 mg. Use a 0.05 significance level to test the claim that these two types of cigarettes have different amounts of nicotine.

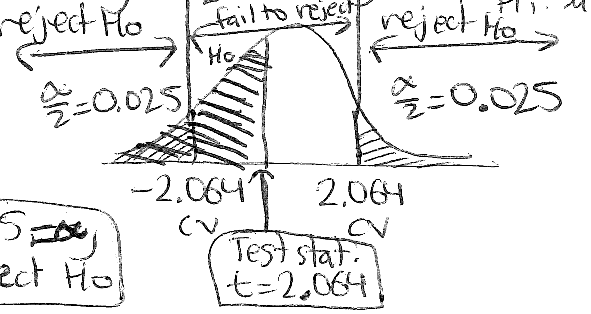
menthol $n_1=25$ $\bar{x}_1=0.87mg$ $s_1=0.24mg$ Claim: $\mu_1\neq\mu_2$ $\alpha=0.05$

nonmenthol $n_2=25$ $\bar{x}_2=0.92mg$ $s_2=0.25mg$ $H_0: \mu_1=\mu_2$ 2T

$df=24$ $H_1: \mu_1\neq\mu_2$

Test stat:

$$t=\frac{(0.87-0.92)}{\sqrt{\frac{(0.24)^2}{25}+\frac{(0.25)^2}{25}}}=\boxed{-0.721}$$



p-value >0.20>0.05=α, fail to reject Ho

I.C.
Fail to reject Ho.

F.C.
There is not sufficient sample data evidence to support the claim that $\mu_1\neq\mu_2$ (these two types of cigarettes having different amounts of nicotine) at 5% significant level.

4. Listed below are the costs (in dollars) of repairing the front ends and rear ends of cars when they were involved in low-speed crash tests. Construct a 95% confidence interval of the mean of the differences between front repair costs and rear repair costs. Is there a difference?

Front repair cost:	936	978	2252	1032	3911	4312	3469	2598	4535
Rear repair cost:	1480	1202	802	3191	1122	739	2769	3375	1787
d	-544	-224	1450	-2159	2789	3573	700	-777	2748

Claim: $\mu_d\neq0$

$H_0: \mu_d=0$ 2T

$H_1: \mu_d\neq0$

$\alpha=0.05$

$\bar{d}=839.6$

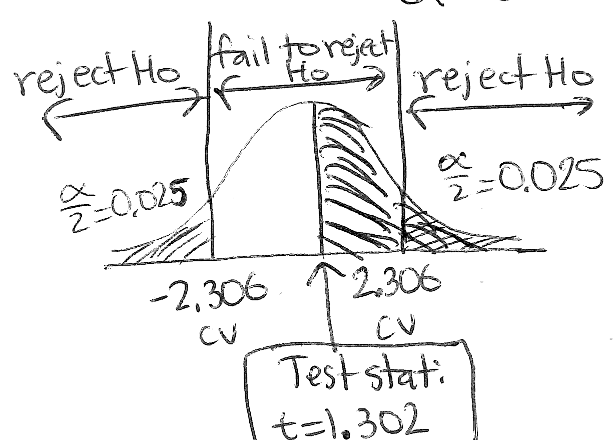
$s_d=1935.1$

$n=9$

$df=8$

Test stat:

$$t=\frac{839.6-0}{\frac{1935.1}{\sqrt{9}}}=\boxed{1.302}$$



I.C.
Fail to reject Ho.

F.C.
There is not sufficient sample data evidence to support the claim that $\mu_d\neq0$ (there is a difference between front and rear repair costs) at 5% significant level.

NAME Aleksandr Gorokhov

Worksheet #22

1. Calculate the correlation coefficient for the following data.

X:	12	15	35	42	18	25	31	55	40	28	32
Y:	9	33	14	28	21	46	27	13	50	20	16

$r = 0.0201$

2. 1. Listed below are combined city-highway mpg ratings for different cars. The old ratings are based on tests before 2008, and the new ratings are based on tests in 2008. Is there sufficient evidence to conclude that there is a linear correlation between the old and new ratings?

Old:	16	27	17	33	28	24	18	22	20	29	21
New:	15	24	15	29	25	22	16	20	18	26	19

$\Sigma x = 255,\ \Sigma x^2 = 6213,\ n = 11$

$\Sigma y = 229,\ \Sigma y^2 = 4993,$

$\Sigma xy = 5569$

$\bar{x} = 30.27$

$\bar{y} = 25.18$

$$r = \frac{11(5569) - (255)(229)}{\sqrt{(11)(6213) - (255)^2} \cdot \sqrt{(11)(4993) - (229)^2}} = 0.998$$

reject Ho   fail to reject Ho   reject Ho

-1 -0.602 CV 0.602 CV

Test stat: $t = 0.998$

I.C. Reject Ho.

F.C. There is sufficient sample data evidence to support an existence of a strong positive linear correlation between the old and new ratings.

3. Listed below are the amounts (in dollars) college students spend on food weekly. Using a 0.01 significance level, is there a correlation between the amounts freshman and seniors spend on food weekly?

Seniors:	25	14	22	18	24	15	23
Freshman:	24	26	34	28	17	18	20