Final 236 + 231

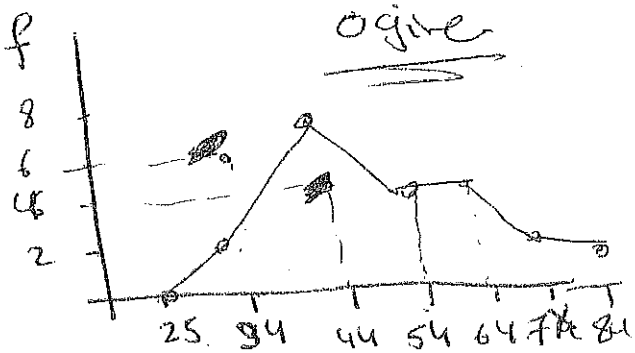
جامعة بيرزيت

Mathematics Department
Stat. 236

Final Exam	Summer
Instructor: Fathi Allan	
Student Name: ..... No.:	Section:.....

Q#1: Dinner check amounts at La Maison French restaurant have the following frequency distribution.

Dinner check ($)	Frequency
25-34	2
35-44	6
45-54	4
55-64	4
65-74	2
75-84	2
Total	20



a) Compute the mean, mode , and median of the given data
b) Compute the variance.
c) Construct the frequency curve of the data.

classes	Frequency	mid. point	Mf	$(MF-\bar{X})$	$(MF-\bar{X})^2$
25-34	2	29.5	59	71.5	56.3
35-44	6	39.5	237	185.5	3440.3
45-54	4	49.5	198	146.5	21482.3
55-64	4	59.5	238	186.5	34782.3
65-74	2	69.5	139	87.5	7656.3
75-84	2	79.5	159	67.5	4556.3
total	20		$=\sum MF=1030$		109,924 total

(a) $\bar{X} = \frac{\sum fX}{n} \Rightarrow \frac{1030}{20} = 51.5$ mode ⇒ higher frequencies

(b) $S^2 = \frac{(\sum Mi - \bar{y})^2}{n-1} = \frac{109,924}{20-1} = 5785.4$

median $20 \times \frac{50}{100} = 10$

Cmulitive f $= 2+6+4 = 12$

... of ... ⇒ 44-54

(2) The probability that a person stopping at a service station, will ask to have his oil checked is 0.28, the probability that he will ask to have his tire pressures checked is 0.11, and the probability that he will ask to have both checked is 0.04. What are the probabilities that a person stopping at this service station, will ask to have

b) his oil, his tire pressures, or both checked?

c) neither his oil nor his tire pressures checked?

$P(O) = 0.28 \quad P(T) = 0.11 \quad P(O \cap T) = 0.04$

$P(\overline{T \cap O}) = 1 - P(O \cap T)$

$1 - 0.04 \Rightarrow 0.96$

$P(T \cap O) = 0.04$

(3) The following table represents the probability distribution of the discrete random variable x:

x	P(x)	x P(x)
-1	.1	-0.1
0	.5	0
1	K	0.2
2	.2	0.4
		0.5

(a) Find the value of k.

(b) Find $P(-1<x<2)$.

(c) Find E(x) and Var(x)

(a) $\Sigma P(x) = 1$

$.1 + .5 + K + .2 = 1$

$K = 0.2$

(b) $P(-1<x<2)$

$1 - [P(-1) + P(2)]$

$1 - [0.1 + 0.2] = 0.7$

c) $E(x) = \Sigma x P(x) = 0.5$

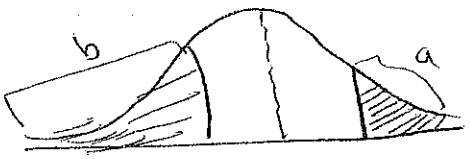
$Var(x) \{ (x P(x) - E(x))^2$

(4) The monthly income of families of BZU students living in the district of Jerusalem is normally distributed with mean 950 JD and standard deviation of 100 JD. A student from Jerusalem is selected. Find:

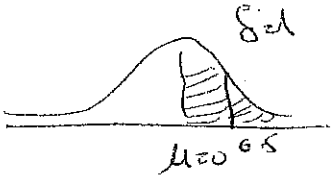
a) The probability that his or her family's income is more than 1000 JD.

b) The probability that his or her family's income is less than 700.

c) Assume that the percentage of students from the district of Jerusalem at BZU is 15%. If we select a student at random from BZU, what is the probability that this student is from Jerusalem and his or her family's income is more than 1000 JD. Explain your answer.



(a) $\frac{1000 - 950}{100} = \frac{50}{100} = 0.5$



(a) = 0.1915 from table

greater than 1000 : $0.5 - .1915 = 0.3085$

(b) $\frac{700 - 950}{100} = \frac{-250}{100} = -2.5$

from table ⇒ 0.4938

$0.5 - 0.4938 = 0.0062$

(5) From the consumption and expenditure survey conducted by the PCBS, its seen from a sample of 416 families, that the average monthly expenditure per family on Tobacco is 30.7 JD in Jenin district and a standard deviation of 30 JD. While the average consumption on Tobacco is 24.7 JD in Hebron district with a standard deviation of 30 JD from a sample of 680 families.

a) construct two 95% confidence intervals for the mean expenditure on Tobacco in Jenin and Hebron District.

b) Does the above data suggest that the mean expenditure on Tobacco for the Jenin district is more than that for the Hebron district. Explain your answer.

c) From a sample of 4500 families taken at random from the West Bank and Gaza, its seen that the average monthly expenditure on Tobacco is 25 JD per family with a standard deviation of 30 JD. Construct a 95% confidence interval for the average expenditure on Tobacco in Palestine. If we know that we have 460,000 families in Palestine, find a 95% confidence interval for the total amount of the monthly expenditure on Tobacco for Palestine. Also construct a 95% confidence interval for the total expenditure on Tobacco in Palestine per year. What do you notice???.

d) Assume that we would like to estimate the mean expenditure on Tobacco in the district of Jenin with a margin of error E= 1 JD. What sample size do you recommend?

$n_J = 416$ ف $\bar{x}_J = 30.7$ JD $S_J = 30$ JD

$\bar{x}_h = 24.7$ JD S_H 30 $n_h = 680$

سؤال مباشر طالع حضرات

لف دوارين

(6) A filling machine in a large factory is supposed to fill 10 ounces of a certain kind of drink in bottles. A random sample of 36 bottles were selected by the quality control engineer produced a 10 2 ounces with standard deviation of 0.5 ounces. Does the data provide sufficient evidence for the quality control engineer to shut down the production process.? Use 5% level of significance

a) state the null and the alternative hypothesis.

b) compute the test statistics.

c) state your conclusion and recommendations for the quality control engineer.

$n = 36 \quad \bar{X} = 10.2$

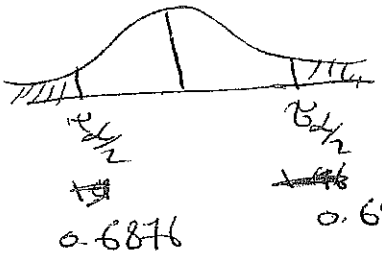
$\alpha = 0.05 \quad S = 0.5$

(a) $H_0 : \mu = 10$

$H_a : \mu \neq 10$

Two tail test

(b) σ unknown $\Rightarrow$ Test statistic $Z_{\alpha/2}$ $-Z_{\alpha/2}$



(c)

$$-Z \Rightarrow = \frac{10.2 - 10}{\frac{0.5}{\sqrt{36}}} = 2.4$$

reject Ho Recomdation

جامعة بيرزيت

Mathematics Department
Stat. 236

Final Exam Spring

Instructor: Faisal Awartani

Student Name ..... No. ..... Section .....

1- A sample of 400 households from the West Bank and Gaza were asked if they were connected with the telephone network and if they own a computer or not. The answers of the survey are summarized in the following table:

		owns a computer	
		Yes	No
Do you have a telephone connection?	Yes	16	144
	No	24	216

a) Find the probability a household owns a computer?

b) If a household is connected with the telephone network, find the probability that the household owns a computer.

c) Find the probability that a household owns a computer and connected with the telephone network at the same time.

C / I	Yes	No	total
yes	16	144	160
No	24	216	240
total	40	360	400

(a) $P(C) = \frac{160}{400}$

(b) $P(C/T) = \frac{P(C \cap T)}{P(T)} = \frac{\frac{40}{400}}{\frac{160}{400}} = \frac{40}{160} = 0.25$

(c) $P(C \cap T) = \frac{16}{400}$

d) Are the events of computer ownership and telephone connection independent? Explain your answer.

e) An Internet company is interested in estimating their potential market in Palestine among households As you might know, a household can be eligible for Internet connection if it is connected with the telephone network and owns a computer at the same time. Knowing that we have 440,407 households in Palestine, estimate the size of the potential market for the Internet company.

d) = If independent $\Rightarrow P(C \cap T) = P(C)P(T)$

$\frac{16}{400} \neq \frac{40}{400} \times \frac{160}{400}$

not independent.

e) $P(T/C) = \frac{P(T \cap C)}{P(C)} = \frac{\frac{16}{400}}{\frac{40}{400}} = \frac{16}{40}$

potential market $= \frac{16}{40} \times 440,407 = 176,163$

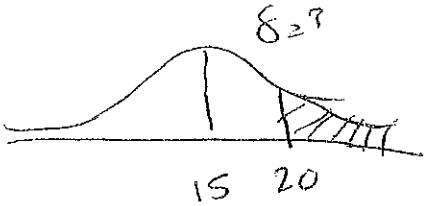
2- Suppose that the average waiting time before service in a local bank is normally distributed with a mean of 15 min and standard deviation of 3 min. Suppose a customer goes to the bank , evaluate the following:

a- P(waiting more than 20 min).

b- P(waiting between 13 min and 17 min)

c- P(waiting less than 9 min).

$\mu = 15 \quad \delta = 3$



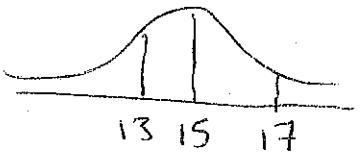
(a) $Z = \frac{20-15}{3} = \frac{5}{3} = 1.67$

Probality $\Rightarrow 0.5 - P(0<Z<0.33)$

$= 0.5 - 0.1293$

$= 0.3707$

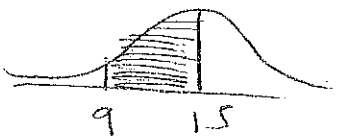
(b) $Z_1 = \frac{13-15}{15} = \frac{-2}{3} = 0.67$



$Z_2 = \frac{17-15}{15} = \frac{2}{3} = 0.67$

Probability $= 0.0517 + 0.0517 = 0.1034$

(c)



$Z = \frac{9-15}{3} \quad \frac{-6}{3} = -2$

$P(0<Z<2) = 0.4772$

$0.5 - 0.4772 = 0.0228$

3- Referring to question # 2 the bank manager hired two more tellers in the bank to reduce the waiting time of customers. After a month he decided to test whether or not the waiting time has been reduced. He observed the waiting time of a random sample of n=16 customers. The sample produced an average waiting time of 12 min and a standard deviation of 3 min. Does the data provide a sufficient evidence for the manager that the waiting time has been reduced? Test using 5% level of significance. Show your work.

$n = 16 \quad \bar{X} = 12 \quad S = 3 \quad \alpha = 5\%$

$H_0: \mu \leq 10$

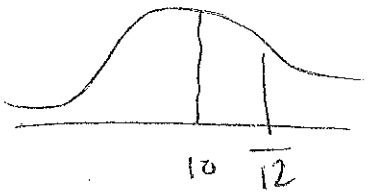
$H_1: \mu > 10$

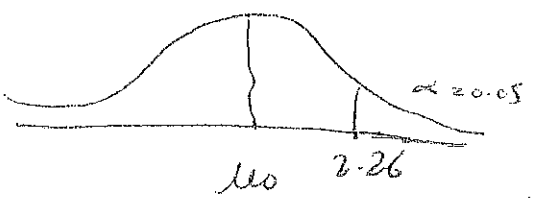
$S_{\bar{X}} = \frac{3}{\sqrt{16}} = 0.75$

$Z = \frac{\bar{X} - \mu}{S_{\bar{X}}} = \frac{12 - 10}{0.75} = \frac{2}{0.75} = 2.67$

P-value $0.5 - 0.4962 = 0.0038$

$0.0038 < 0.05$ Reject H_1, Do not Reject H_0





BIRZEIT UNIVERSITY
Mathematics Department
STAT236 – ~~Final~~ Exam - Fall 2013

10 x 1.25 = 12.5 / 30

Student Name:..... Student ID:..1100826.....

Instructor: Dr. Tareq Sadeq Section: 2 10:00 – 12:00
1 12:00 – 2:00

Formulas:

Exponential distribution: $F(x_0) = 1 - e^{\frac{-x_0}{\mu}}$

Standard error of the sample mean: $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}\sqrt{\frac{N-n}{N-1}}$ (Finite population)

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$ (Infinite population)

Standard error of the sample proportion: $\sigma_{\bar{p}} = \sqrt{\frac{p(1-p)}{n}}\sqrt{\frac{N-n}{N-1}}$ (Finite population)

$\sigma_{\bar{p}} = \sqrt{\frac{p(1-p)}{n}}$ (Infinite population)

Interval estimation of the population mean (σ known): $E = Z_{\alpha/2}\,\sigma/\sqrt{n}$

Interval estimation of the population mean (σ unknown): $E = t_{\alpha/2}\,s/\sqrt{n}$

The assembly time for a product is uniformly distributed between 6 to 10 minutes. **Questions 1 – 3.**

1. The probability of assembling the product in 7 minutes or more is
a. 0.25 b. 0.75 c. 1 d. 0 e. 0.33

2. The time where 50% of all products will be assembled is 0.5
a. 5 b. 6 c. 7 d. 8 e. 9

3. The variance of time of assembling the product.
a. 4 b. 16 c. 0.75 d. 1.155 e. 1.33

4. Two ice-cream sellers are located on a hotel's beach of one kilometer length. The distance between the two sellers has an exponential distribution with a mean of 250 meters. If one of the sellers decides to sit on one side of the beach, what is the probability that the other seller will choose a point in the next hotel's beach of the other side of the first seller?

a. 0.9817 b. 0.9933 c. 0.0183 d. 0.0067 e. 0.0116

Suppose the scores on an examination for 1000 students are normally distributed with a mean of 50 and a standard deviation of 10. **Questions 5 – 11.**

5. What is the probability that the score of a student will be higher than 56.5?

a. 0.2578 b. 0.7422 c. 0.7578 d. 0.2422 e. 0.65

6. What proportion of the students scores below 45?

a. 0.1915 b. 0.6915 c. 0.50 d. 0.3085 e. 1

7. What is the score that corresponds to z = 1.5?

a. 35 b. 15 c. 65 d. 50 e. None of these

8. What is the probability that a student has a score equal to 70?

a. 0.9722 b. 0.0278 c. 0 d. 0.9444 e. 1

9. What is the value of the 40th percentile of scores?

a. 41.6 b. 80.2 c. 52.53 d. 40 e. 47.47

10. What is the probability that a selected student is of the top 10% of scores?

a. 0.1 b. 0.9 c. 0.15 d. 0.5398 e. 0

11. If a sample of 25 students is taken from the scores, what is the probability that the sample mean is greater than 55?

a. 0.0062 b. 0.6915 c. 0.3085 d. 0.9938 e. 0.84

12. The central limit theorem states if the sample size n is large then

a. The distribution of the sample data is approximately normal.
b. The distribution of the sample mean is approximately standard normal.
c. The distribution of the sample mean is approximately normal.
d. The distribution of the population mean is approximately normal.

In a large population of adults, the mean IQ is 112 with a standard deviation of 20. Suppose 200 adults are randomly selected for a market research campaign. **Questions 13 – 14.**

13. The distribution of the sample mean IQ is

a. Exactly normal with mean 112 and standard deviation 20.
b. Approximately normal with mean 112 and standard deviation of 0.1.
c. Approximately normal with mean 112 and standard deviation of 1.414
d. Approximately normal with mean 112 and standard deviation of 2015.

14. What is the probability that the sample mean IQ will be within 2 points of the population mean?

a. 0.9207 b. 0.8415 c. 0.9830 d. 0.9650 e. 0.035

15. The weights of extra large eggs have a normal distribution with a mean of 1 oz. and a standard deviation of 0.1 oz. The probability that a dozen eggs weighs more than 13 oz. is closest to

a. 0.0000 b. 0.0020 c. 0.1814 d. 0.2033 e.

Assume that 60% of BZU students are females. **Questions 16 – 17.**

16. In the estimation of the proportion of females at BZU by a sample of 200 students, what is the probability that the sample proportion of females is within 0.04 of the population proportion?

a. 0.8770 b. 0.7540 c. 0.8529 d. 0.9265 e. 0.2551

17. What is the approximate probability that at least 130 of the sample are females?

a. 0.9251 b. 0.0749 c. 0.5832 d. 0.2358 e. 0.7642

18. A students selects a sample of students for her seminar. The selection was for students with ID numbers xxxxx10. This sampling method is:

a. Simple random sampling
b. Systematic sampling
c. Stratified sampling
d. Cluster sampling
e. Convenience sampling

19. Which of the following statements is true?

a. When the sample size increases error of estimation increases.
b. When level of confidence increases error of estimation decreases.
c. When Alpha increases error of estimation decreases.
d. When the level of confidence increases the standard error of the sample mean decreases.

20. In the interval estimation of the mean, when the population standard deviation is unknown:

a. We can't estimate the population mean
b. The sample range can replace the standard deviation
c. The distribution of the sampling of the mean is bell-shaped but not normal
d. The distribution of the sampling of the mean is normal

21. In the interval estimation of the mean, if the sample size is 4 times the initial sample size, the error of estimation is decreased to _____ of the initial error of estimation:

a. half b. one-fourth c. three-fourths d. one-fifth e. None

22. You are given a confidence interval for the population mean of [26 ; 42]. The sample mean used to construct this confidence interval was:

a. 1.96
b. 31
c. 34
d. cannot be determined with the given information

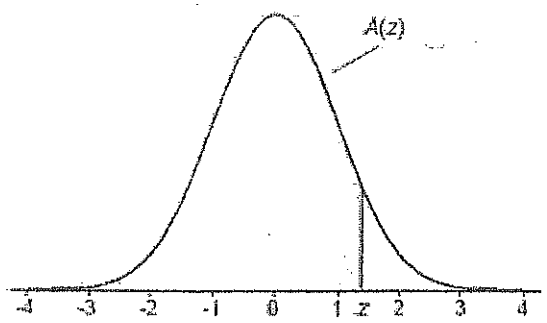
23. The 95% confidence interval of the population mean based on a sample of 16 elements with a mean equal to 25 and a sample standard deviation equal to 4:

a. [23.04 ; 26.96]
b. [23.289 ; 26.711]
c. [23.247 ; 26.753]
d. [22.936 ; 27.064]

24. When n = 500, $t_{0.05} \cong$

a. 0.05 b. 1.645 c. 1.96 d. 1.691 e. 2.131

$E - t_{0.05}$; $E + t_{0.05}$



being more than z standard deviations abo
mean. Values of z of particular importanc

z	$A(z)$	
1.645	0.9500	Lower limit of right 5% tail
1.960	0.9750	Lower limit of right 2.5% ta
2.326	0.9900	Lower limit of right 1% tail
2.576	0.9950	Lower limit of right 0.5% ta
3.090	0.9990	Lower limit of right 0.1% ta
3.291	0.9995	Lower limit of right 0.05% t

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999							

t Distribution: Critical Values of t

Degrees of freedom	~~*Two-tailed test:*~~ *One-tailed test:*	*Significance level* 10% 5%	5% 2.5%	2% 1%	1% 0.5%	0.2% 0.1%	0.1% 0.05%
1		6.314	12.706	31.821	63.657	318.309	636.619
2		2.920	4.303	6.965	9.925	22.327	31.599
3		2.353	3.182	4.541	5.841	10.215	12.924
4		2.132	2.776	3.747	4.604	7.173	8.610
5		2.015	2.571	3.365	4.032	5.893	6.869
6		1.943	2.447	3.143	3.707	5.208	5.959
7		1.894	2.365	2.998	3.499	4.785	5.408
8		1.860	2.306	2.896	3.355	4.501	5.041
9		1.833	2.262	2.821	3.250	4.297	4.781
10		1.812	2.228	2.764	3.169	4.144	4.587
11		1.796	2.201	2.718	3.106	4.025	4.437
12		1.782	2.179	2.681	3.055	3.930	4.318
13		1.771	2.160	2.650	3.012	3.852	4.221
14		1.761	2.145	2.624	2.977	3.787	4.140
15		1.753	2.131	2.602	2.947	3.733	4.073
16		1.746	2.120	2.583	2.921	3.686	4.015
17		1.740	2.110	2.567	2.898	3.646	3.965
18		1.734	2.101	2.552	2.878	3.610	3.922
19		1.729	2.093	2.539	2.861	3.579	3.883
20		1.725	2.086	2.528	2.845	3.552	3.850
21		1.721	2.080	2.518	2.831	3.527	3.819
22		1.717	2.074	2.508	2.819	3.505	3.792
23		1.714	2.069	2.500	2.807	3.485	3.768
24		1.711	2.064	2.492	2.797	3.467	3.745
25		1.708	2.060	2.485	2.787	3.450	3.725
26		1.706	2.056	2.479	2.779	3.435	3.707
27		1.703	2.052	2.473	2.771	3.421	3.690
28		1.701	2.048	2.467	2.763	3.408	3.674
29		1.699	2.045	2.462	2.756	3.396	3.659
30		1.697	2.042	2.457	2.750	3.385	3.646
32		1.694	2.037	2.449	2.738	3.365	3.622
34		1.691	2.032	2.441	2.728	3.348	3.601
36		1.688	2.028	2.434	2.719	3.333	3.582
38		1.686	2.024	2.429	2.712	3.319	3.566
40		1.684	2.021	2.423	2.704	3.307	3.551
42		1.682	2.018	2.418	2.698	3.296	3.538
44		1.680	2.015	2.414	2.692	3.286	3.526
46		1.679	2.013	2.410	2.687	3.277	3.515
48		1.677	2.011	2.407	2.682	3.269	3.505
50		1.676	2.009	2.403	2.678	3.261	3.496
60		1.671	2.000	2.390	2.660	3.232	3.460
70		1.667	1.994	2.381	2.648	3.211	3.435
80		1.664	1.990	2.374	2.639	3.195	3.416
90		1.662	1.987	2.368	2.632	3.183	3.402
100		1.660	1.984	2.364	2.626	3.174	3.390

2013-2014

Stat. 236 // Final Exam Sample
Instructor: Mohammad Madiah

Q# 1: Circle the correct answer

1. In **point** estimation
   - **a)** data from the population is used to estimate the population parameter
   - **b)** data from the sample is used to estimate the population parameter
   - **c)** data from the sample is used to estimate the sample statistic
   - **d)** the mean of the population equals the mean of the sample
2. Suppose a four-sided object is tossed and each side is **equally likely** to occur. What is the probability of any one side landing face down?
   - **a)** 0.2
   - **b)** 0.17
   - **c)** 0.25
   - **d)** 0.5
3. **A bell-shaped distribution has a mean of 20 and a standard deviation of 4. Based on Empirical .**What percentage of data lies between 12 and 28?
   - **a)** 95 %
   - **b)** 68 %
   - **c)** 81%
   - **d)** 99.7 %
4. The number of different simple random samples of size 4 that can be selected from a population of size 6 when the order of selection is not important (permutations) is
   - **a)** 24
   - **b)** 6
   - **c)** 10
   - **d)** 15
5. If the coefficient of variation of a data set is 60 % and the mean is 70, then the **variance** is
   - **a)** 1764
   - **b)** 2800
   - **c)** 117
   - **d)** 42
6. The daily time spent by BZU students at the main library has a **uniform distribution** with a range from 30 minutes to 55 minutes. What is the average daily time a student will spend at the main library?
   - **a)** 35
   - **b)** 42.5
   - **c)** 52.5
   - **d)** 62.5
7. To select a random sample of 100 students at BZU, one proposes to select 10 Science students, 30 Commerce students, 20 Engineering students, 35 Arts students, and 5 Law students based on the distribution of all BZU students in faculties. This method is a:
   - **a)** Simple random sampling
   - **b)** Stratified sampling
   - **c)** Systematic sampling
   - **d)** Cluster sampling
8. A statistic is a numerical characteristic of a population
   - **a)** True **b)** False

9. The **interquartile range** is not the best measure of dispersion because it eliminates 50% of the distribution. The 50% of the distribution that is eliminated is:
   a) the middle 50%
   b) the upper 50%
   c) the lower 50%
   d) the lower 25% and the upper 25%

There are 105 applicants for a job with a new coffee shop. Some of the applicants have worked at coffee shops before and some have not served coffee before. Some of the applicants can work full-time, and some can only work part-time. The exact breakdown of applicants is as follows...

	Coffee Shop Experience (E)	No Coffee Shop Experience (not E)
Available Full-Time (F)	20	12
Available Part-Time (not F)	42	31

Find each of the following probabilities. Questions 8 & 9

10. The probability someone has coffee shop experience
    a) 0.29
    b) 0.32
    c) 0.59
    d) 0 .19
11. The probability someone has coffee shop experience and is available full-time.
    a) 0.29
    b) 0.32
    c) 0.59
    d) 0 .19
12. Which of the following statements about the probability of Type I and Type II error is **not** correct?
    a) Type I error can never occur if Ho is false.
    b) Type II error can never occur if Ho is true.
    c) If Ho is true, it is possible to make a Type I error or a correct decision.
    d) If Ho is true, it is possible to make a Type II error or a correct decision.
13. A researcher wants to measure the number of pounds رطل أمريكي of tin تنك the population recycles on average every year (decimal places are possible). He randomly samples data from 100 recycling plants around the country. What type of scale would be used to measure the tin weight?
    a) Nominal
    b) Ordinal
    c) Interval
    d) Ratio
14. If the 40th percentile on an examination is 75.5, then
    a) 40% of the people got a score of 75.5
    b) less than 40% of the people got a score higher than 75.5
    c) 40% of the people got a score of 75.5 or less
    d) 60% of the people got a score lower than 75.5
15. Which of the following is an example of **non probability** sampling?
    a) simple random sampling
    b) cluster sampling
    c) judgment sampling

16. A college professor claims that the grades of his class are normally distributed. To receive an A in his class, a student must have grade that is **at least 1.5 standard deviations** above the mean. What percent of his students will receive anA.?

a) About 7 %
b) About 14 %
c) About 43 %
d) This value can not be determined with the information given.

17. A state welfare agency wants to estimate the average amount of time prospective clients are kept waiting in the office before their application interview. They would like to estimate this time within 3 minutes of the true average and be 90% confident in their result. It is estimated that the standard deviation of this waiting time is 10 minutes. How **large** a sample do they need?

a) 41
b) 17
c) 68
d) 31

18. As a general rule, the normal distribution is used to approximate the sampling distribution of the sample proportion, $\hat{p}$, only if.

a) The sample size n is greater than 30
b) The population proportion p is close to 0.50
c) The underlying population is normal
d) np and $n(1-p)$ are both greater than or equal to 5

19. A soft drink filling machine, when in perfect adjustment, fills the bottles with 12 ounces of soft drink. Any over filling or under filling results in the shutdown and readjustment of the machine. To determine whether or not the machine is properly adjusted, the correct set of hypotheses is

a) H_0: $\mu < 12$ H_a: $\mu \leq 12$
b) H_0: $\mu \leq 12$ H_a: $\mu > 12$
c) H_0: $\mu = 12$ H_a: $\mu \neq 12$
d) H_0: $\mu \neq 12$ H_a: $\mu = 12$

20. You are given a confidence interval for the population mean of 26 to 42. The sample mean used to construct this confidence interval was:

a) 1.96
b) 26
c) 34
d) can not be determined with the given information

21. A random sample of 1000 people was taken. Four hundred fifty of the people in the sample favored Candidate A. The 95% confidence interval for the true proportion of people who favors Candidate A is

a) 0.419 to 0.481
b) 0.40 to 0.50
c) 0.45 to 0.55
d) 1.645 to 1.96

22. The academic planner of a university thinks that at least 35% of the entire student body attends summer school. The correct set of hypotheses to test his belief is

a) H_0: $P > 0.35$ H_a: $P \geq 0.35$
b) H_0: $P \geq 0.35$ H_a: $P < 0.35$
c) H_0: $P \leq 0.35$ H_a: $P > 0.35$
d) H_0: $P > 0.35$ H_a: $P \leq 0.35$

23. X is a random variable with the probability function:

$f(x) = \frac{x}{6}$ for x = 1,2 or 3. The **expected value** of X is

a) 0.333
b) 0.500
c) 2.000
d) 2.333

24. During Palestinian elections, the preliminary results indicate that 20% of a sample of voters did not vote to any candidate. A polls center needs to estimate the population proportion of voters who did not vote to any candidate. What is the needed sample size in order to get a margin of error of 0.02 at the level of confidence 90%?

a) 100
b) 1537
c) 1083
d) 658

25. Which of the following is a discrete quantitative variable?

a) The Dow Jones Industrial average
b) The volume of water released from a dam
c) The distance you drove yesterday.
d) The number of employeesat BZU

26. The z-score measures

a) The distance between a data value and the mean.
b) The percentage of the dataset variability.
c) The ratio of the mean to the standard deviation.
d) The number of standard deviations between a data value and the mean.

Q#2 Show all your work

The proportion of defective itemsis not allowed to be over 20%. A buyer wants to test whether the proportion of defectives exceeds(يزيد عن) the allowable limit(الحد المسموح). The buyer takes a random sample of 100 items and finds that 26are defective. Use $\alpha = 1\%$

1. State the null and alternative hypotheses for this test.

   Ho:----------

   Ha:----------

2. What is the value of the critical value:----------

3. What is the rejection rule(use the value of the critical value)

   ---

4. Calculate the standard error of the sample proportion

   ---

5. Calculate the appropriate test statistic----------

   ---

6. Find the p-value

   ---

7. What is your decision:----------

8. What is your conclusion ----------

Q#3

A random sample of 16 students selected from the student body of a large university had an average age of 25 years and a standard deviation of 2 years. We want to determine if the average age of all the students at the university is significantly more than 24. Assume the distribution of the population of ages is normal. Use $\alpha = 0.01$

a) State the null and the alternative hypothesis.

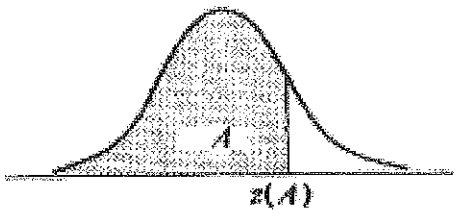
b) Find the test statistic

c) What is (are) the critical value(s)?

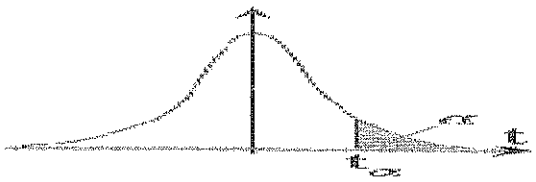
d) What is your conclusion?

e) Construct and interpret the 99% confidence interval for the average age of all the students at the university.

Entry is area A under the standard normal curve from $-\infty$ to $z(A)$



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9



T-Distribution Table

df	0.1	0.05	0.025	0.01	0.005	0.001	0.0005
1	3.078	6.314	12.706	31.821	63.656	318.289	636.578
2	1.886	2.920	4.303	6.965	9.925	22.328	31.600
3	1.638	2.353	3.182	4.541	5.841	10.214	12.924
4	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	1.476	2.015	2.571	3.365	4.032	5.894	6.869
6	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	1.314	1.703	2.052	2.473	2.771	3.421	3.689
28	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	1.311	1.699	2.045	2.462	2.756	3.396	3.660
30	1.310	1.697	2.042	2.457	2.750	3.385	3.646
60	1.296	1.671	2.000	2.390	2.660	3.232	3.460
120	1.289	1.658	1.980	2.358	2.617	3.160	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.091	3.291

Stat 236 –2014

Q#1(12%): Circle the correct answer

1. One of the following is true
   a) If P (A) = 0.4 and P (B) = 0.6, then A and B must be mutually exclusive.
   b) If P (A or B) = 1, then A and B must be mutually exclusive.
   c) If either A or B must occur they are called mutually exclusive.
   d) If A and B cannot occur at the same time they are called mutually exclusive
2. What type of data would answer the following question: How much gas do you use per week?
   a) Quantitative Discrete
   b) Quantitative Continuous
   c) Qualitative
3. You are interested in the average amount of money a Ramallah family of 5 spends on groceries each month. You will survey 50 families of size 5.Which type of sampling technique does the following method represent?

Call 50 of your parents' friends who have a family of size 5 and ask them.

   a) Stratified
   b) Cluster
   c) Convenience
   d) Systematic
4. The Z score of an observation measures how many standard deviations is the value from the mean
   a) True
   b) False
5. According to the Chebyshev's rule, at least 84% of all observations in any data set are contained within a distance of how many standard deviations around the mean?
   a) 2
   b) 2.5
   c) 1.5
   d) 3
6. The value of one score in a distribution is changed from X = 20 to X = 30. Which measure(s) of central tendency is/are **certain** بدك to be changed?
   a) the mean and the median
   b) the mean
   c) the median
   d) the mode
7. A market researcher computed a confidence interval for a population proportion using a 99% confidence level. Her boss decided that she wanted a 95% confidence level instead. The new interval with 95% confidence level will be wider than the original one with a 99% confidence level.
   a) True
   b) False
8. Which of the following p-values will lead us to reject the null hypothesis if the level of significance equals 0.05?
   a) 0.065
   b) 0.150
   c) 0.100
   d) 0.001
9. The coefficient of variation measures variability in a data set relative to the size of the median
   a) True
   b) False

10. Which of the following statistics are resistant to outliers?
    I. The median
    II. The standard deviation
    III. The interquartile range
    a) I and II only
    b) I and III only
    c) II and III only
    d) I, II, and III
    e) None of the above.
11. A correlation of r = - 0.35 indicates that the scatter diagram of the data would show
    a) Points tightly packed around a line that slopes up to the right.
    b) Points tightly packed around a line that slopes down to the right.
    c) Points widely scattered around a line that slopes up to the right.
    d) Points widely scattered around a line that slopes down to the left.
12. If a hypothesis test leads to the rejection of the null hypothesis
    a) a Type I error may have been committed
    b) a Type II error must have been committed
    c) a Type II error may have been committed
    d) a Type I error must have been committed

Q#2 (40%): *Circle* the correct answer. *Justify* your answer

(1 – 2)The time, measured in minutes, that a student gets help from a certain math TA at mathematics department follows an exponential distribution with mean of 5 minutes.

1. Find the probability that a student spends less than 10 minutes getting help from this teacher.
    a) 0.8647
    b) 0.5353
    c) 0.8521
    d) 0.1353
2. 25% of the students get help from this TA for at most how long?
    a) 6.93 min.
    b) 1.43 min.
    c) 0.06 min.
3. The mean of a sample values: 3, 5, 12, 3 and 2 is
    a) 25
    b) 4.18
    c) 4
    d) 17.5
    e) 5
4. The median of a sample values: 1, 5, 12, 3 and 4 is
    a) 25
    b) 4.18
    c) 4
    d) 17.5
    e) 5
5. The variance of a sample values: 1, 5, 12, 3 and 4 is
    a) 25
    b) 4.18
    c) 4
    d) 17.5
    e) 5

6. Calculate the Interquartile Range (IQR) for the following numbers: 1, 4, 7, 11, and 12.
   a) 3
   b) 7
   c) 4
   d) 5
7. In a sample of 400 voters, 360 indicated they favor XY brand of energy drink. The 99% confidence interval of voters **not** favoring XY brand of energy drink is
   a) 0.871 to 0.929
   b) 0.061 to 0.139
   c) 0.765 to 0.835
   d) 0.071 to 0.129
   e) None of the above
8. If E and F are events with P (E AND F) = 0.1, P (E | F) = 0.25, and P (F | E) = 0.2, find P(E **OR** F).
   a) 0.4
   b) 0.32
   c) 0.2
   d) 0.8
9. In a single-sample **t - test**, what is the respective critical value for:
   $\alpha = 0.05$, n=10, one – tailed test:
   a) 1.41
   b) 1.833
   c) 2.262

(10 – 12) The monthly telephone expenditure of a student of BZU is uniformly distributed from 20 NIS to 70 NIS. One student of BZU is randomly selected. (Let *X* = the monthly telephone expenditure of a student of BZU).

10. Find the probability that the expenditure of the selected student is less than 50 NIS
    a) 0.2
    b) 0.8
    c) 0. 4
    d) 0.6
11. The 40th percentile of the expenditure of a student of BZU is:
    a) 60 NIS
    b) 56 NIS
    c) 38 NIS
    d) 40 NIS
12. Find the probability that the income of the selected citizen is less than 30 NIS, GIVEN that it is less than 40 NIS.
    a) 0.2
    b) 0.66
    c) 0.34
    d) 0.5
    e) None of the above
13. A certain type of new business succeeds 60% of the time. Suppose that 4 such businesses open (where they do not compete with each other, so it is reasonable to believe that their relative successes would be independent) , the probability that all 4 businesses fail is
    a) 0.0256
    b) 0.9744
    c) 0.1296
    d) 0.8704
    e) None of the above

(14 – 16) Assume that the hourly number of customers served by the TNB Bank is 16 customers. Let X be the number of customers served hourly.

14. What is the name of the probability distribution of the number of customers served hourly
    a) Binomial
    b) Exponential
    c) Uniform
    d) Poisson
15. What is the probability that on any given 15 minutes period this bank will serve more than 2 customers?
    a) 0.0916
    b) 0.7619
    c) 0.9084
    d) 0.2381
    e) None of the above
16. What is the expected number of customers served by this bank in two work days (eight hours daily)
    a) 256
    b) 80
    c) 128
    d) None of the above
17. A sample of size 50 is taken from an infinite population whose mean and standard deviation are 68 and 12, respectively. The probability that the sample mean is larger than 66 equals
    a) 11.96%
    b) 60%
    c) 88.04%
    d) 40%
    e) None of the above
18. Suppose $P(A) = 0.50$, $P(B) = 0.75$, and A and B are independent. The probability of the complement of the event (A and B) is:
    a) 0 .125
    b) 0 .625
    c) 0.75
    d) 0 .25

(19 – 20) At a computer manufacturing company, the actual size of computer chips is normally distributed with a mean of 1 centimeter and a standard deviation of 0.1 centimeter. A random sample of 12 computer chips is taken.

19. What is the probability that the sample mean will be between 0.98 and 1.02 centimeters?
    a) 0.4902
    b) 0.2736
    c) 0.5098
    d) 0.9024
    e) None of the above
20. Above what value do 5% of the sample means fall?
    a) 1.2
    b) 1.057
    c) 0.94
    d) 1.047
    e) None of the above

Q#3(20%): Short answers

1. In order to estimate the average time spent on the computer terminals per student at a BZU, data were collected for a sample of 81 business students over a one week period. Assume the population standard deviation is 1.8 hours. If the sample mean is 9 hours, then the 95% confidence interval is

2. According to a survey of 320 BZU students who drive, 40 students have been involved in some type of car accident (minor to major).Construct a 99% Confidence Interval for the true proportion of BZU students that drive who have been involved in some type of car accident (minor to major).

3. A survey organization would like to estimate a population percentage in a large population to an accuracy of 15 percentage points with 95% confidence. They have no current knowledge of the size of the population percentage. How large should a random sample be selected to achieve their goal for the margin of sampling error?

4. A survey of 16 doctors selected at random revealed that the average annual consumption of aspirin tablets per doctor was 100 with a standard deviation of 32. Establish 95% confidence limits for the average annual consumption of aspirin tablets of all doctors. (Assume that the population is normal).

5. A student believes that no more than 70% of the students who finish a stat 236 course will pass the course. A random sample of 150 students was taken. Thirty six of the students in the sample passed. Using the *p*-value approach, test the hypotheses at the 1% level of significance.

Q#4(20%): Show all your work

Trying to encourage people to stop driving to campus, the university claims that on average it takes people 30 minutes to find a parking space on campus. I don't think it takes so long to find a spot. In fact I have a sample of the **last five** times I drove to campus, and I calculated $\bar{x} = 24 \text{minutes}$. Assuming that the time it takes to find a parking spot is normal, and that $\sigma = 8 \text{ minutes}$. Perform a hypothesis test with 1% significant level to see if the claim is correct.

1) State the null and alternative hypotheses for this test.

   Ho

   Ha

2) What is (are) the critical value (s)? What is the rejection rule?

3) Calculate the appropriate test statistic

4) Find the p-value

5) What is your conclusion:

6) What is your decision if the significant level is changed to 10%?

7) Construct and **interpret** the 98% confidence interval for the population mean.