



Department of Statistics & Operations Research  
College of Science, King Saud University



STAT 145  
Final Examination  
Second Semester 1431 – 1432 H

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- Mobile Telephones are not allowed in the classrooms.
- Time allowed is **3 Hours**.
- Answer all questions.
- Choose the nearest number to your answer.
- For each question, put the code (**Capital Letters**) of the correct answer in the following table beneath the question number. **Do not use pencil or red pens.**

1	2	3	4	5	6	7	8	9	10
A	D	A	C	A	C	B	C	B	D
11	12	13	14	15	16	17	18	19	20
B	D	B	A	B	A	A	B	C	A
21	22	23	24	25	26	27	28	29	30
C	D	B	C	A	B	B	A	D	D
31	32	33	34	35	36	37	38	39	40
A	C	C	B	A	D	D	C	B	A
41	42	43	44	45	46	47	48	49	50
B	C	C	B	B	B	B	B	C	A

Term Marks	Final Exam. Marks	Total Marks

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Following are the weights (in kg) for a sample of 6 children.

**13, 20, 18, 12, 15, and 12.**

(1) The mean of the data is:

A)	12	B)	<u>15</u>	C)	10	D)	18
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(2) The median of the data is:

A)	17	B)	12	C)	10	D)	<u>14</u>
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(3) The mode of the data is:

A)	<u>12</u>	B)	20	C)	15	D)	2
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(4) The variance of the data is:

A)	3.347	B)	3.055	C)	<u>11.200</u>	D)	9.333
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(5) The coefficient of variation ( C.V.) of the data is:

A)	<u>22.3%</u>	B)	17.4%	C)	74.7%	D)	62.22%
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Temperatures recorded at 2 pm for 5 days of a year, for a city are:

**7, 4, 0, -5, and 40.**

(6) The range of temperatures is:

A)	33	B)	40	C)	<u>45</u>	D)	5
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(7) The most suitable measure of centre for the data is:

A)	Mean	B)	<u>Median</u>	C)	Mode	D)	Range
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Let A and B denote two events defined on the same sample space with  $P(A) = 0.6$ ,  $P(B) = 0.4$ , and  $P(A \cup B) = 0.74$ , then:

(8) The events A and B are:

A)	independent	B)	mutually exclusive	C)	<u>dependent</u>	D)	impossible
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(9) The  $P(\bar{A} \cup \bar{B})$  is:

A)	0.18	B)	<u>0.26</u>	C)	0.50	D)	1.00
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Consider the following cumulative frequency distribution table for the ages of all workers in a certain factory.

Age	Cumulative frequency
26 - 35	10
36 - 45	40
46 - 55	50

(10) Percentage of workers in the age group 36 - 45 is:

A)	40%	B)	80%	C)	30%	D)	<u>60%</u>
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(11) Number of workers having age 36 or more is:

A)	90	B)	<u>40</u>	C)	10	D)	50
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(12) The true class limits for the first class are:

A)	26 - 35	B)	21.5 - 35.5	C)	25.5 - 34.5	D)	<u>25.5 - 35.5</u>
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**Let A and B be two independent events. Suppose that  $P(A) = 0.6$  and  $P(B) = 0.3$  then**

(13)  $P(\bar{A} \cap B)$  equals:

A)	0.08	B)	<u>0.12</u>	C)	0.20	D)	0.42
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(14)  $P(A \cup B)$  equals:

A)	<u>0.72</u>	B)	0.90	C)	0.10	D)	0.7
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**Suppose that a town has 20% of men known to have a certain disease. A certain medical test is applied to randomly selected 500 men. The following data is obtained.**

	Disease		
Test	Present	Absent	Total
Positive	82	80	162
Negative	38	300	338
Total	120	380	500

Let an individual be selected at random from the sample.

(15) The probability that the selected person has the disease is:

A)	0.20	B)	<u>0.24</u>	C)	0.68	D)	0.32
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(16) The probability that the test gives a false negative result is:

A)	<u>0.32</u>	B)	0.68	C)	0.21	D)	0.79
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(17) The sensitivity of the test is:

A)	<u>0.68</u>	B)	0.16	C)	0.51	D)	0.79
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(18) Suppose that 20% of men in the town have the disease, the predictive probability negative for the test is:

A)	0.37	B)	<u>0.62</u>	C)	0.09	D)	0.89
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**In a large population of people, 34% have blood type A+. If we randomly choose 8 persons from this population and let X = the number in the 8 chosen that with blood type A+.**

(19) The values of the parameters of the distribution are:

A)	3 and 0.34	B)	8, and 0.66	C)	8 and 0.34	D)	8 and 34
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(20) The probability that there is exactly one person with blood type A+:

A)	0.1484	B)	0.0028	C)	0.3400	D)	0.0185
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(21) The probability that there is at least one person with blood type A+ :

A)	0.1484	B)	0.1844	C)	0.9640	D)	0.0360
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The number of serious surgical operations that are performed in a hospital during a day follows a Poisson distribution with an average of 5 persons per day, then:

(22) The probability that no operations is performed in the next day is:

A)	0.99996	B)	0.0067	C)	0.54210	D)	0.08972
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(23) The probability that 5 operations are performed in the next day is:

A)	0.2145	B)	0.8521	C)	0.175	D)	0.5124
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(24) The average number of operations that are performed in two days is:

A)	20	B)	10	C)	5	D)	30
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**In a population of people,  $X =$  the body mass index (in  $\text{kg}/\text{m}^2$ ) is normally distributed with mean  $\mu = 25$  and standard deviation  $\sigma = 2$ . For a randomly chosen person,**

(25)  $P(24 < X < 26) =$

A)	0.6915	B)	0.3830	C)	0.2085	D)	1
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(26)  $P(X > 21) =$

A)	0.9772	B)	0.0228	C)	1	D)	
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(27)  $P(X = 21) =$

A)	0.9772	B)	0.0228	C)	1	D)	0
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(28) Find the value of k such that  $P(X > k) = 0.2578$ .

A)	0.257	B)	25	C)	- 0.65	D)	26.3
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**A sample of size 100 is taken from a population having a proportion  $p_1 = 0.8$ . Another independent sample of size 400 is taken from a population having a proportion  $p_2 = 0.5$ .**

(29) The sampling distribution for the difference in sample proportions has a mean equals:

A)	0.3	B)	1.3	C)	0	D)	0.8
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(30) The sampling distribution for the difference in sample proportions has a standard error equals:

A)	0.015	B)	0.0022	C)	<u>0.047</u>	D)	0.1239
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(31)  $P(\hat{p}_1 - \hat{p}_2 < 0.2) = :$

A)	0.4423	B)	0.993	C)	<u>0.0166</u>	D)	0.2415
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**Suppose it has been established that for a certain type of client the average length of a home visit by a public health nurse is 45 minutes with a standard deviation of 15 minutes, and that for a second type of client the average home visit is 30 minutes with a standard deviation of 20 minutes. If a nurse randomly visits 35 clients from the first population and 40 from the second population, then**

(32) The mean of the difference between two sample means is:

A)	5	B)	<u>15</u>	C)	20	D)	35
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(33) The standard deviation of the difference between two sample means is:

A)	<u>4.0532</u>	B)	16.4286	C)	8.2143	D)	0.5241
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(34) The probability that the average length of home visit will differ between the two groups by 20 or more is:

A)	0.8907	B)	0.4215	C)	0.5	D)	<u>0.1093</u>
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**A researcher wishes to determine if vitamin E supplements could increase cognitive ability among elderly women. In 1999 the researcher recruits a sample of elderly women age 75-80. At the time of the enrollment into the study, the women were randomized to either take Vitamin E, or a placebo for six months. At the end of the six month period, the women were given a cognition test. Higher scores on this test indicate better cognition. The mean of the test scores of 81 women who took vitamin E supplements was  $\bar{X}_1 = 27$ , while the mean of the test scores of the 90 women who took placebo supplements was  $\bar{X}_2 = 24$ . Assuming the two populations follow approximately two different normal distributions with standard deviations,  $\sigma_1 = 6.9$  and  $\sigma_2 = 6.2$ , respectively.**

(35) The point estimate for the difference between the two population means ( $\mu_1 - \mu_2$ ):

A)	27	B)	24	C)	6.2	D)	<u>3</u>
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(36) The standard error for the difference between the two sample means ( $\bar{X}_1 - \bar{X}_2$ ):

A)	6.9	B)	6.2	C)	<u>1.007</u>	D)	3
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(37) A lower limit of a 95% C.I. for the difference between the two population means ( $\mu_1 - \mu_2$ ):

A)	<u>1.0263</u>	B)	4.9745	C)	5.9120	D)	1.2354
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Six healthy three year old female sheep were injected with the antibiotic Gentamicin, at a dosage of 10 mg/kg body weight. Their blood serum concentrations (mg/ml) of Gentamicin after injection were 33; 26; 34; 31; 23; 25, the summary statistics for these data are

n	mean	Standard deviation	SE(mean)
6	28.67	4.59	1.87

Assuming the data follows approximately a normal distribution,

(38) The standard error of the sample mean is equal to:

A)	0.25	B)	<u>1.87</u>	C)	4.59	D)	28.67
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(39) At the 90%, the ratability coefficient is equal to:

A)	2.33	B)	<u>2.015</u>	C)	3.215	D)	1.96
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(40) The 90% confidence interval for the population mean score on this test is:

A)	(27.412, 30.145)	B)	(24.48, 29.10)	C)	<u>(24.902, 32.438)</u>	D)	(32.48, 39.55)
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(41) The test statistic for testing the hypotheses  $H_0 : \mu = 30$  vs  $H_1 : \mu < 30$  is equal to:

A)	-2.2587	B)	2.5812	C)	<u>-0.7112</u>	D)	3.3412
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(42) At the 5% significance level the critical region is :

A)	<u><math>(-\infty, -2.015)</math></u>	B)	$(-2.015, 2.015)$	C)	$(2.015, \infty)$	D)	$(2.58, \infty)$
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(43) At the 5% significance level we are able to :

A)	Reject $H_0$	B)	<u>Not to reject <math>H_0</math></u>	C)	Decision is not possible
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A biostatistician , found that among 2000 boys ages 7 to 12 years. 400 were overweight. On the basis of this study:

(44) The standard error of the sample proportion of the overweight boys ages 7 to12 years is:

A)	0.0500	B)	<u>0.0089</u>	C)	0.6587	D)	0.0221
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(45) The 99% upper confidence limit for the population proportion of the overweight boys ages 7 to12 years is:

A)	0.5000	B)	<u>0.223</u>	C)	0.6587	D)	0.0221
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(46) The test statistic for testing the hypotheses the proportion of boys ages 7 to 12 year does not equal 18 is:

A)	-2.2587	B)	<u>2.33</u>	C)	-0.7112	D)	3.3412
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(47) At the 5% significance level, can we conclude that more than 18% of boys ages 7 to 12 years are overweight:

A)	Yes	B)	<u>No</u>	C)	Decision is not possible
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A sample of 25 freshman nursing students made a mean score of 77 on a test designed to measure the attitude toward the dying patient. The sample standard deviation was 10. Assuming the data comes from a normal population,

(48) The statistical hypothesis for testing the hypothesis that the mean score is different than 80 is:

A)	$H_0 : \mu = 80$ vs $H_1 : \mu \neq 80$	B)	$H_0 : \mu = 80$ vs $H_1 : \mu < 80$
C)	$H_0 : \mu = 80$ vs $H_1 : \mu > 80$	D)	$H_0 : \mu = 77$ vs $H_1 : \mu < 77$

(49) The test statistic for these statistical hypothesis is:

A)	-1.500	B)	-2.025	C)	3.258	D)	0
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(50) At the 5% significance level we are able to :

A)	Reject $H_0$	B)	<u>Not to reject <math>H_0</math></u>	C)	Decision is not possible
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