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

STAT 145
Final Examination
Second Semester1431 – 1432 H

			اسم الطالب
	رقم التحضير		الرقم الجامعي
	اسم الدكتور		رقم الشعبة

- 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.**
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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

(2) The median of the data is:

A)	17	B)	12	C)	10	D)	<u>14</u>

(3) The mode of the data is:

A)	<u>12</u>	B)	20	C)	15	D)	2

(4) The variance of the data is:

A)	3.347	B)	3.055	C)	<u>11.200</u>	D)	9.333

(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

(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∪B) = 0.74, then:

(8) The events A and B are:

A)	independent	B)	mutually exclusive	C)	<u>dependent</u>	D)	impossible

(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>

(11) Number of workers having age 36 or more is:

A)	90	B)	<u>40</u>	C)	10	D)	50

(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

(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

(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

(17) The sensitivity of the test is:

A)	<u>0.68</u>	B)	0.16	C)	0.51	D)	0.79

(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

(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

(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

(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

(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 kg/m^2) is normally distributed with mean μ = 25 and standard deviation σ = 2. For a randomly chosen person,

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

A)	0.6915	B)	0.3830	C)	0.2085	D)	1

(26) $P(X > 21) =$

A)	0.9772	B)	0.0228	C)	1	D)	

(27) $P(X = 21) =$

A)	0.9772	B)	0.0228	C)	1	D)	0

(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

(30) The sampling distribution for the difference in sample proportions has a standard error equals:

A)	0.015	B)	0.0022	C)	0.047	D)	0.1239

(31) $P(\hat{p}_1 - \hat{p}_2 < 0.2)$ = :

A)	0.4423	B)	0.993	C)	0.0166	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)	15	C)	20	D)	35

(33) The standard deviation of the difference between two sample means is:

A)	4.0532	B)	16.4286	C)	8.2143	D)	0.5241

(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)	0.1093

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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 $\overline{X}_1$ = 27, while the mean of the test scores of the 90 women who took placebo supplements was $\overline{X}_2$ = 24 Assuming the two populations follow approximately two different normal distributions with standard deviations, σ_1 = 6.9 and , σ_2 = 6.2, respectively.

(35) The point estimate for the difference between the two population means (μ_1-μ_2):

A)	27	B)	24	C)	6.2	D)	3

(36) The standard error for the difference between the two sample means ($\overline{X}_1 - \overline{X}_2$):

A)	6.9	B)	6.2	C)	1.007	D)	3

(37) A lower limit of a 95% C.I. for the difference between the two population means (μ_1-μ_2):

A)	1.0263	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)	1.87	C)	4.59	D)	28.67

(39) At the 90%, the ratability coefficient is equal to:

A)	2.33	B)	2.015	C)	3.215	D)	1.96

(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)	**(**24.902, 32.438**)**	D)	(32.48, 39.55)

(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)	-0.7112	D)	3.3412

(42) At the 5% significance level the critical region is :

A)	$(-\infty, -2.015)$	B)	$(-2.015, 2.015)$	C)	$(2.015, \infty)$	D)	$(2.58, \infty)$

(43) At the 5% significance level we are able to :

A)	Reject H_0	B)	Not to reject H_0	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)	0.0089	C)	0.6587	D)	0.0221

(45) The 99% upper confidence limit for the population proportion of the overweight boys ages 7 to12 years is:

A)	0.5000	B)	0.223	C)	0.6587	D)	0.0221

(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)	2.33	C)	-0.7112	D)	3.3412

(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)	No	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

(50) At the 5% significance level we are able to :

A)	Reject H_0	B)	Not to reject H_0	C)	Decision is not possible