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

STAT 145 Final Exam
Semester II 1430- 1431 H

Student Name:			
Student Number:		**Section Number:**	
Teacher Name:		**Attendance Number**	

- Mobile Telephones are not allowed in the classrooms.
- Time allowed is 3 hours
- You are not allowed to transfer calculator or any thing to others
- Choose the nearest number to your answer.
- For each question, **put the code in capital letter** of the correct answer, in the following table, beneath the question number:

كلية العلوم تتمنى لكم التوفيق والسداد وتؤكد على أن الدراسة
ستبدأ من الأسبوع الأول للعام الدراسي القادم أن شاء الله ، وسيكون
هناك درجات إضافية للحضور خلال الأسبوعين الأولين من الدراسة.

Note: Answer only 40 questions and put X in five questions.

1	2	3	4	5	6	7	8	9	10
B	B	A	B	A	61.86	B	D	C	A

11	12	13	14	15	16	17	18	19	20
C	B	B	A	D	C	D	A	B	D

21	22	23	24	25	26	27	28	29	30
B	D	C	A	A	A	A	A	A	A

31	32	33	34	35	36	37	38	39	40
B	A	B	C	D	B	C	B	C	D

41	42	43	44	45
B	C	A	A	A

Marks Final from 50	
Semester marks	
Total out of 100	

Let X be the number of patients admitted to a clinic in a day. The following table gives the probability distribution of X.

x	0	1	2	3
P(X = x)	.2	.4	.3	K

1. The value of K is:

(A) 0.3	(B) 0.1	(C) 0	(D) 0.2

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You are given the following sampled Data:

15	**14**	**16**	**13**	**11**	**14**	**43**

2. The best measure of center is:

(A) the mean	(B) the median	(C) the variance	(D) the mode

3. The mean of the data is:

(A) 18	(B) 12	(C) 17	(D) 18.67

4. The median of the data is:

(A) 12	(B) 14	(C) 17	(D) 9.5

5. The sample variance of the data is:

(A) 124.00	(B) 11.14	(C) 10.31	(D) 106.29

6. The Coefficient of variation for the data is:

(A) 12.5%	(B) 113.2%	(C) 61.86%	(D) 25.33%

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The following table gives the classification of a group of 100 patients for diabetics (D) and high blood pleasure (H)

of disease Type	D	$\overline{D}$	**Total**
H	15	30	**45**
$\overline{H}$	25	30	**55**
Total	**40**	**60**	**100**

7. The event $\overline{D}$ and H are :

(A)Independent	(B) Dependent	(C) Disjoint	(D) Mutually Exclusive

8. The probability that the person is D or H is:

(A) 0.4	(B) 0.95	(C) 0.85	(D) 0.7

9. The probability that the person is D and $\overline{H}$ is:

(A) 0.4	(B) 0.95	(C) 0.25	(D) 0.7

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The following table shows the results of a screening test evaluation in which a random sample of 650 subjects with disease and an independent sample of 1200 subjects without the disease participated:

Test results	**Present (D)**	**Absence ($\bar{D}$)**	**Total**
Positive (T)	490	70	**560**
Negative ($\bar{T}$)	160	1130	**1290**
Total	**650**	**1200**	**1850**

Use this data to answer the questions 10 - 13:

10. The probability of false positive result is:

(A) 7/120	(B) 113/120	(C) 49/65	(D) 16/65

11. The sensitivity of the test is:

(A) 7/120	(B) 113/120	(C) 49/65	(D) 16/65

12. The specificity of the test is:

(A) 7/120	(B) 113/120	(C) 49/65	(D) 16/65

If the true probability of the disease is 0.002 then:

13. The predictive value positive of the test is:

(A) 0.977	(B) 0.025	(C) 0.999	(D) 0.992

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Suppose that in an emergency room, the number of emergency cases in an hour follows a Poisson distribution with a mean of 5 emergency cases per hour.

14. The probability that there will be at most one emergency case received in an hour is:

(A) 0.0404	(B) 0.7356	(C) 0.0274	(D) 0.016

15. The probability that there will be exactly one emergency case per 30 minutes is:

(A) 0.050	(B) 0.7356	(C) 0.094	(D) 0.205

16. The average number of emergency cases in one day is:

(A) 6	(B) 48	(C) 120	(D) 24

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Suppose it is known that the height X of an individual from a certain population is approximately normal with a mean μ = 70 inch and a variance σ^2 = 9 inch square. A person is picked up at random from this group.

17. The probability that the height will be more than 74 inch is:

(A) 0.9082	(B) 0.3400	(C) 0.0475	(D) 0.0918

18. The probability that $P(X < \mu)$ is:

(A) 0.5000	(B) 0. 00	(C) 1.000	(D) 0.400

19. The probability that $P(X = 50)$ is:

(A) 0.5000	(B) 0. 00	(C) 1.000	(D) 0.400

20. The value of k such that $P(X > k) = 0.67$ is:

(A) 0.44	(B) 70.75	(C) 69.25	(D) 68.68

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Consider that 4 babies were born in a hospital and we need to observe whether a baby born is a boy or a girl. Assume that the probability a baby is a boy is 0.5. Use binomial distribution to answer Q. 21 - 24.

21. The probability that at most two boys were born is:

(A) 0.3125	(B) 0.6875	(C) 0.3750	(D) 0.6250

22. The probability that at least one boy was born is:

(A) 0.2500	(B) 0.7500	(C) 0.8000	(D) 0.9375

23. The expected number of boys born in this hospital is:

(A) 0.6875	(B) 1.000	(C) 2.000	(D)**)** 0.9375

24. The variance of the distribution of the number of boys born in the hospital is:

(A) 1	(B) 0.6875	(C) 2.000	(D) 0.9375

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Suppose the mean and the standard deviation of serum iron values for healthy men are $\mu = 120$ and $\sigma = 15$ micrograms (mg) per 100 ml respectively. If $\overline{X}$ is the mean of serum iron of a random sample of size $n = 50$ healthy men, then:

25. The probability distribution of the sample $\overline{X}$ is approximately:

(A) normal	(B) Binomial	(C) Poisson	(D) none of them

26. The standard error $\sigma_{\bar{x}}$ of the sampling distribution of $\overline{X}$ is:

(A) 2.1213mg	(B) 1.10 mg	(C) 2.17 mg	(D) 0.13 mg

27. The probability that $(115 \le \overline{X} \le 125)$ is:

(A) 0.9818	(B) 0.110	(C) 2.17	(D) 0.13

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A random sample of 12 college teachers was taken to determine how much time they spend each week preparing lectures. The average number of hours was $\overline{X} = 8$ and the

standard deviation $S=4$ hours. Assume that the time spend each week preparing lectures is normally distributed.

28. The standard error of $\overline{X}$ is:

(A) 1.155	(B) 3.000	(C) 0.577	(D) 6.00

29. The 90% confidence interval of the mean time spent each week is:

(A)(5.93, 10.07)	(B) (5.02, 10.97)	(C) (4.96, 11.04)	D)(-0.266,1.743)

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The data for 12 college teachers chosen randomly gave an average $\overline{X}=8$ hours and the standard deviation $s=4$ hours. Assume that the time spent each week preparing lectures is normally distributed. Can we conclude at a 0.05 level of significance, that the mean time spent by all teachers each week for preparing lectures is less than 10 hours?

30. The computed value of the test statistic is:

(A) - 1.73	(B) 1.55	(C) 3.14	(D) 2.52

31. The decision is:

(A) We do not reject $H_1: \mu < 10$ (B) We reject $H_1: \mu < 10$

(C) We can not take any decision.

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A new drug is designed to prevent colds. The company states that the effect of drug is different for men and women. To test this claim, they choose a simple random sample of 100 women and 200 men from a population. At the end of the study, 38% of the women caught a cold; and 51% of the men caught a cold. Based on these findings, use a 0.05 level of significance to answer the following questions.

32. The null and the alternative hypotheses are**:**

(A) $H_0: P_1 = P_2$ **versus** $H_1: P_1 \neq P_2$ **(B)** $H_0: P_1 = P_2$ **versus** $H_1: P_1 > P_2$

(C) $H_0: \mu_1 = \mu_2$ **versus** $H_1: \mu_1 \neq \mu_2$ **(D)** $H_0: \mu_1 = \mu_2$ **versus** $H_1: \mu_1 > \mu_2$

33. The hypothesis is:

(A)one sided test	(B) Two sided test	(C) left sided test	(D) right sided test

34. The estimated standard error for the difference of proportion is:

(A) 0.0042	(B) 0.037	(C) 0.061	(D) 0.00017

35. The computed value of the test statistic is:

(A) 5.12	(B) 2.93	(C) 0.0475	(D)) 2.13

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Transverse diameter measurements on the hearts of adult males and females gave the following results.

Group	Sample size (n)	Sample mean($\overline{X}$)	Sample variance
Males	**10**	**70**	**25**
Females	**8**	**65**	**9**

Assume that the samples of males and females are from independent normal populations with means μ_1 and μ_2 respectively and equal variances.

36. The point estimate of the difference between the true means ($\mu_1 - \mu_2$) is:

(A) 4	(B) 5	(C) 6	(D) 7

37. The upper bound of the 95% confidence interval for the difference between the true measurements $(\mu_1 - \mu_2)$ is

(A) 7.02	(B) 2.35	(C) 9.27	(D) 2.99

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In a school district, students were randomly assigned to one of two Stat teachers Ahmed and Bilal . After the assignment, Ahmed had 40 students, and Bilal had 50 students. At the end of the year, each class took the same standardized test. Ahmed's students had an average test score of 80 with a standard deviation of 10. Bilal's students had an average test score of 60 with a standard deviation of 10. We wish to test the hypothesis that Ahmed's students are better than Bilal's students at 0.05 level of significance.

38. The null and the alternative hypothesis are:

A) $H_0 : \mu_1 = \mu_2$ versus $H_1 : \mu_1 \neq \mu_2$ B) $H_0 : \mu_1 = \mu_2$ versus $H_1 : \mu_1 > \mu_2$

C) $H_0 : \mu_1 = \mu_2$ versus $H_1 : \mu_1 < \mu_2$

39. The standard error for the difference of the two means is:

(A) 97.8	(B) 9.89	(C) 2.12	(D) 2.10

40. The computed value of the test statistic is:

(A) 9.5	(B) 5.1	(C) 3.5	(D) 9.4

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In a study on the weight of patients with a certain disease, the researcher selected a random sample of size 100 patients. The mean weight obtained from this sample was 50 kg with standard deviation of 9 kg.

41. The 99% confidence interval for μ is:

(A) (44, 56)	(B) (47.68, 52.31)	(C) (33.6, 44.7)	(D) (48, 52).

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Consider the following dataset, based on two midterms in Bio-statistics examinations. (Assume that the observed differences consist of a random sample from a normally distributed).

Student	**Midterm1**	**Midterm2**	*Difference* d_i	$(d_i - \bar{d})^2$
1	**90**	**95**	**5**	**36**
2	**85**	**89**	**4**	**25**
3	**73**	**76**	**3**	**16**
4	**90**	**92**	**2**	**9**
5	**90**	**91**	**1**	**4**
6	**68**	**67**	**-1**	**0**
7	**90**	**88**	**-2**	**1**
8	**87**	**75**	**-12**	**121**
9	**89**	**85**	**-4**	**9**
10	**96**	**90**	**-6**	**25**

$$\sum_{i=1}^{10}(d_i - \bar{d})^2 = 246$$

42. The upper limit for the 95% confidence interval for the difference between the two midterms scores is:

(A) 2.24	(B) 4.74	(C) 2.74	(D) 4.24

43. The computed value of the test statistic for testing $H_0 : \mu_D = 0$ versus $H_1 : \mu_D \neq 0$ is:

(A) -0.60	(B) 0.191	(C) 0.61	(D) -0.191

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In a survey of drug users in a large city, we found that 20 of 500 were HIV positive. We wish to know if we can conclude that more than 2 percent of the drug users in the population are HIV positive using $\alpha = 0.01$.

44. The computed value of the test statistic is:

(A) 3.19	(B) 2.28	(C) 2.12	(D) 2.93

45. The critical value (or the reliability coefficient) is:

(A) 2.33	(B) 1. 645	(C) 2.645	(D) 1.96

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