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

STAT 145
Final Exam
Semester I 1430- 1431 H

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

- Mobile Telephones are not allowed in the classrooms.
- Time allowed is 180 minutes
- Answer all questions.
- 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:

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

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

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

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

►►► 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:

1) The events A and B are:

(A) independent (B) mutually exclusive (disjoint) (C) **dependent** (D) impossible

►►► Let A and B be two events defined on the same sample space with $P(\bar{A}) = 0.6$, $P(B) = 0.5$ and $P(A \cap B) = 0.1$, then:

2) $P(A \cup B)$ equals to:

(A) 0.3 (B) 0.9 (C) 0.4 (D) **0.8**

►►► The following table shows 1000 nursing school applicants classified according to scores made on a college entrance examination and the quality of the high school from which they graduated, as rated by a group of educators:

Quality of schools Score	Poor (P)	Average (A)	Superior (S)	Totals
Low (L)	105	60	55	220
Medium (M)	70	175	145	390
High (H)	25	65	300	390
Totals	200	300	500	1000

The probability that an applicant selected at random from this group:

3) is graduated from a superior school, is

(A) 0.22 (B) 0.55 (C) **0.5** (D) 1

4) made a low score on the examination and is graduated from a superior school is

(A) 0.00 (B) 0.220 (C) 0.500 (D) **0.055**

5) made a low score on the examination given that she graduated from a superior school is

(A) **0.11** (B) 0.25 (C) 0.50 (D) 0.22

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

Disease / Test results	Present	Absent
Positive	490	70
Negative	160	1130

6) The calculated value of the sensitivity of the test is:

(A) 0.351 (B) 0.303 (C) 0.875 (D) **0.754**

7) The calculated value of the specificity of the test is:

(A) **0.942** (B)0.876 (C) 0.697 (D) 0.246

8) If the rate (probability) of the disease in the general population is 0.002, then the predictive value positive of the test equals to:

(A) 0.005 (B) 0.002 (C) **0.025** (D) 0.029

►►► Let A and B denote two events defined on the same sample space. If P(A) = 0.7, P(B) = 0.3, then:

9) If the events A and B are mutually exclusive (disjoint), the value of $P(A \cup B)$ equals to:

(A) 0.7 (B) 0.21 (C) **1** (D) 0.79

10) If the events A and B are independent, the value of $P(A \mid B)$ is:

(A) **0.7** (B) 0.3 (C) 0.21 (D) 0.4

►►►Consider that 4 babies were born in a hospital. If we assume that a baby is equally Likely to be a boy or a girl then:

11) The probability that at most one boy was born is:

(A) 0.6875 (B) 0.5874 (C) **0.3125** (D) 1.8

12) The probability that at least one boy was born is:

(A) 1 (B**) 0.9375** (C) 0.0625 (D)0 .6

13) The expected number of born boys in this hospital is:

(A) 4 (B) 0.5 (C) **2** (D) 1

14) The Variance of the distribution of the number of boys born in the hospital are:

(A) **1** (B) 2 (C) 4 (D) 0.5

►►► Suppose in an emergency room that X= the number of emergency cases in an hour follows Poisson distribution with a mean of 6 emergency cases per hour.

15) The probability that there will be at most one emergency case received in an hour

(A) 0.015 (B) 0.7358 (C) 0.109 (D**) 0.0174**

16) The probability that there will be exactly one emergency case per 30 minutes is:

(A) 0.094 (B) 0.015 (C) **0.149** (D) 0.050

►►►The weights of 12 Students in a Statistical course were as follows:

55 55 57 59 59 61 61 61 61 63 63 63

17) The sample mean of the students weights is

(A) 60 (B) **59.833** (C) 59 (D) 57

18) The sample mode of the students weights is

(A) **61** (B) 59 (C) 55 (D) 63

19) The sample standard deviation of the students weights is

(A) 2.764 (B) **2.887** (C) 7.639 (D) 8.333

20) The coefficient of variation of the data is:

(A) **4.8%** (B) 20.7% (C) 13.9% (D) 2.1%

►►►State type of the following variable

21) Place of Birth is

(A) Continuous (B) Discrete (C) Quantitative (D) **Qualitative**

►►► The Blood glucose level of patients who attend Clinic A and Clinic B are normally distributed with means μ_A , μ_B and standard deviations $\sigma_A = 9$, $\sigma_B = 6$. Two samples of sizes $n_A = 9$, $n_B = 16$ patients have given $\overline{X}_A = 100$, $\overline{X}_B = 95$ then:

22) The upper limit of 90% Confidence Interval for $\mu_A - \mu_B$ is

(A) 6.574 (B) 11.57 **(C) 10.52** (D) 5.57

23) The lower limit of 90% Confidence Interval for μ_A is

(A) 0.86 (B) 90.05 (C) 104.935 **(D) 95.065**

Suppose we want to test for the Blood glucose level of patients described above, $H_0 : \mu_A = \mu_B$ $against H_A : \mu_A \neq \mu_B$ with $\alpha = 0.1$ then:

24) The suitable test statistic is:

(A) z = -1.111 **(B) z =1.491** (C) t= -1.043 (D) z =3.5

25) The non rejection (acceptance) region of H_0 is equal to:

(A) (-1.645, 1.645) (B) (-1.96, 1.96) (C) $(-\infty$, -1.96) (D) $(-\infty$, -1.645)

26) The decision is:

(A) Reject H_0 (B**) Not reject** H_0 (C) Decision not possible

►►► If P_A, P_B are proportions of patients who attend Clinic A and Clinic B who have low blood glucose level. Two samples of sizes $n_A = 100$, $n_B = 122$ patients have given the sample proportions $\hat{p}_A = 0.15$, $\hat{p}_B = 0.11$ then:

27) The point estimation of P_A is :
(A) 100 (B) clinic A **(C) 0.15** (D) 0.11

28) The upper limit of 95% Confidence Interval for $P_A - P_B$ is
(A) 95 (B) 0.04 **(C) 0.129** (D) 0.115

29) To test $H_0 : P_A = 0.17$; $H_A : P_A \neq 0.17$, the suitable test statistic is:
(A) **z = - 0.532** (B) z =5.6 (C) t = -1.06 (D) z =3.5

►►►Let Z be a standard normal variable,
30) The probability that a z will have a value between z = -2.87 and z=2.64 is:
(A) 0.0021 **(B) 0.9938** (C) 0.9959 (D) 0.9858

31) The value of K such that P(-K < Z < K) = 0.754 is:
(A) 1.16 (B) 0.7734 (C) 1.96 (D) 1.99

►►► Suppose it is known that the heights of a certain population of individuals are approximately normally distributed with a mean of 70 inches and a standard deviation of 3 inches.

32) In a population of 10000 people, those expected to be 77 inches tall or taller are:
(A) 102 (B) 95 (C) 105 **(D) 99**

►►►The mean and standard deviation of serum iron values for healthy men are 120 and 15 micrograms per 100 ml, respectively.

33) The probability that a random sample of 50 normal men will yield a mean between 115 and 125 micrograms per 100 ml is:

(A) 0.0091 (B) 0.9509 **(C) 0.9818** (D) 0.8999

►►► The mean serum cholesterol level for males aged 20-74 years was 211. The standard deviation was approximately 90. Consider the sampling distribution of the sample mean based on samples of size 50 drawn from this population.

34) The standard error of the sampling distribution is:
(A) 21.111 (B) 1.800 (C) 10.1265 **(D) 12.728**

►►► For a normal population, the mean is 9.7 and the standard deviation is 6.0. A simple random sample of size 40 is drawn from this population.

35) The probability that the sample mean is between 7 and 10.5 will be:
(A) 0.8123 **(B) 0.7973** (C) 1.0305 (D) 0.7995

►►►A person wished to obtain the 99 percent confidence interval for the mean of a population. The data are approximately normally distributed with a variance of 144. A sample of 16 subjects yielded a mean of 84.3.

36) The reliability coefficient (factor) will be:
A) 1.69 B) 1.645 C) 1.96 **D) 2.575**

►►► In a study of 35 patients, the average delay time was 17.2 minutes. Previous research had shown the standard deviation to be about 8 minutes. The population distribution was felt to be non normal.

37) The 90 percent confidence interval for μ , the true mean amount of delay time is:
(A) **(15.0, 19.4)** (B) (14.55, 19.85) (C) (13.71, 20.69) (D) (14.50, 19.90)

►►► A sample of 100 apparently normal adult males, 25 years old, had a mean systolic blood pressure of 125. It is believed that the population standard deviation is 15.

38) - The 95 percent confidence intervals for the population mean is:
(A) (122.53, 128.87) **(B) (122.06, 127.94)** (C) (121.55, 128.45) (D)(121.13, 127.47)

►►► A simple random sample from a normally distributed population gave the observations: 0.90, 0.97, 1.03, 1.10, 1.04, 1.00. Here, the mean is 1.007 and the sample standard deviation is 0.068.

39) A 95 percent confidence interval for the population mean is:
(A) (1.123, 1.354) (B) (0.939,1.075) (C) (0.753,.895) **(D) (0.936, 1.078)**

40) Using the t distribution, the reliability factor for a confidence interval based on 99% confidence level and sample size of 8 will be:
(A) 3.3554 (B) 2.998 (C) 1.8946 **(D) 3.4995**