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

STAT 145 - Final Exam Semester I - 1432- 1433 H

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

- 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, **use pen to 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	B	A	B	D	C	B	D	C	B

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

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

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

41	42	43	44	45	46	47	48	49	50
A	C	D	B	A	B	C	A	D	D

QUESTION 1-4:

The probability that a certain X-ray machine produces a defective X-ray is 0.20. Six X-rays are selected at random from a number of X-rays produced by the X-ray machine. Let Y denote the number of defective X-rays from the sample.

(1) P(Y≤1) is:

(A)	0.8011	(B)	0.9011	(C)	**0.6553**	(D)	0.2621

(2) P(Y>1) is:

(A)	0.8011	(B)	**0.3447**	(C)	0.6553	(D)	0.3932

(3) The expected number of the defective X-rays is:

(A)	**1.2**	(B)	1	(C)	2	(D)	6

(4) The standard deviation of the defective X-rays is:

(A)	3	(B)	**0.98**	(C)	0.2	(D)	0.96

QUESTION 5-7:

Suppose that the human breaths per minute X for adult are normally distributed with mean 16 and standard derivation 4. If an adult is chosen at random, the probability that X will be

(5) less than 20 is:

(A)	0.2547	(B)	0.1587	(C)	0.2488	(D)	**0.8413**

(6) at least 18 is:

(A)	0.2547	(B)	0.987	(C)	**0.3085**	(D)	0.6915

(7) between 12 and 17 is:

(A)	0.1600	(B)	**0.4400**	(C)	0.5000	(D)	0.5900

QUESTION 8-11:

Suppose that the mean number X of cases visiting the emergency clinic (E-clinic) at KKUH is four cases per hour. By assuming Poisson distribution, then

(8) P(X >1) is:

(A)	0.2149	(B)	0.0916	(C)	0.2158	(D)	**0.9084**

(9) $P(1 \le X < 3)$ is:

(A)	0.587	(B)	0.2789	(C)	**0.2198**	(D)	0.7802

(10) The standard deviation of the number of cases visiting the E-clinic is:

(A)	1.521	(B)	**2**	(C)	3	(D)	4

(11) The expected number of cases visiting the E-clinic in 6 hours is:

(A)	4	(B)	**24**	(C)	10	(D)	12

QUESTION 12-15:

The following table classified 500 persons according to Thrombosis and smoking habit.

	Smoking Group	
	Smoking(S)	Non-smoking(S^c)
Thrombosis (T)	5	4
Non thrombosis (T^c)	145	346

(12) The probability that a patient selected randomly has a thrombosis and is smoker, is:

(A)	0.05	(B)	0.10	(C)	**0.01**	(D)	0.50

(13) The probability that the patient has a thrombosis is:

(A)	0.500	(B)	0.444	(C)	0.556	(D)	**0.018**

(14) The probability that the patient has a thrombosis given that he does not smoke is:

(A)	0.0080	(B)	**0.0114**	(C)	0.7000	(D)	0.692

(15) The probability that a patient selected randomly has a thrombosis or is smoker is:

(A)	0.318	(B)	0.108	(C)	0.103	(D)	**0.308**

QUESTION 16 -18:

The following table shows the results of a screening test evaluation in which a random sample of 325 subjects with the disease and an independent random sample of 600 subjects without the disease participated:

	Disease	
Test results	Present	Absent
Positive	245	35
Negative	80	565

(16) The specificity value of the test is:

(A)	0.0619	(B)	**0.9417**	(C)	0.6108	(D)	0.0583

(17) The sensitivity value of the test is:

(A)	**0.7538**	(B)	0.8750	(C)	0.4083	(D)	0.2462

(18) Assuming the rate of the disease in the general population is 0.001, the predictive value positive of the test is:

(A)	0.9282	(B)	0.9872	(C)	**0.0128**	(D)	0.0252

QUESTION 19 - 25:

Consider the following data set: 10, 7, 7, 10, 7, 6, 5, 6, 5
Then,

(19) The mode value is:

(A)	10	(B)	**7**	(C)	6	(D)	5

(20) The median value is:

(A)	9	(B)	6	(C)	5	(D)	**7**

(21) The range value is:

(A)	4	(B)	**5**	(C)	10	(D)	9

(22) The standard deviation value is:

(A)	1.928	(B)	2.987	(C)	**1.871**	(D)	3.500

(23) The coefficient of variation value is:

(A)	2 %	(B)	374 %	(C)	50%	(D)	**27 %**

(24) The sample size is:

(A)	4	(B)	7	(C)	**9**	(D)	10

(25) The mean value is:

(A)	6	(B)	6.5	(C)	**7**	(D)	7.5

QUESTION 26 - 30:

A simple random sample of size 10 is drawn from a normal population. The sample resulted in $\bar{x} = 5.2$ and S = 4.08.

(26) The point estimate of the population mean is:

(A)	10	(B)	4.08	(C)	**5.2**	(D)	7.5

(27) The standard deviation of the point estimate of the population mean is:

(A)	10	(B)	4.08	(C)	5.2	(D)	**1.29**

(28) The computed value of the test statistic for testing H_0: $\mu = 3$ against H_1: $\mu > 3$ is:

(A) 4.08	(B) 1.96	(C) 1.29	(D) **1.71**

(29) Suppose $\alpha = 0.05$, then the critical value of the test is:

(A) **1.833**	(B) 1.96	(C) 2.262	(D) 1.645

(30) The decision is:

(A) **accept H_0**	(B) reject H_0	(C) accept H_0 and H_1	(D) rejectH_0 and H_1

QUESTION 31:

Suppose that a large sample of size n is taken from a non-normal population with mean μ and variance σ^2.

(31) The distribution of the sample mean $\bar{x}$ will be:

(A) **Normal with mean μ and variance σ^2/ n**	(B) Normal with mean μ and variance σ^2	**(C)** Standard normal

QUESTIONS 32 - 34:

In a simple random sample of size 36 drawn from a population with a mean of 100 and a standard deviation of 36,

(32) the probability that the sample mean will be less than 91 is:

(A) 0.1549	(B) 0.0753	**(C) 0.0668**	(D) 0.0875

(33) the probability that the sample mean will be more than 98 is:

(A) 0.5468	**(B) 0.6293**	(C) 0.8527	(D) 0.7169

(34) the probability that the sample mean will be between 95 and 105 is:

(A) 0.5934	(B) 0.6174	(C) 0.8432	(D) 0.7647

QUESTIONS 35 - 37

In a study on obesity, a sample of 950 adult Saudi women in the Western Region seeking care at primary health centers was taken. It was found that 611 of these were obese. We wish to construct a 99 % confidence interval for the true proportion of adult Saudi women in the Western Region seeking care at primary health centers who are obese.

(35) The standard error estimate of sample proportion is:

(A) 2.58	(B) 0.480	(C) 0.230	**(D) 0.016**

(36) The 99 % confidence interval for the true proportion is:

(A) $\mathbf{0.643 \pm 0.04}$	(B) 0.643 ± 0.031	**(C)** 0.643 ± 0.016	(D) 0.643 ± 0.026

(37) The width of the 99 % confidence interval for the true proportion is:

(A) **0.082**	(B) 0.031	**(C)** 0.041	(D) 0.643

QUESTIONS 38 - 41:

A random sample of size $n_1 = 25$, taken from a normal population with a standard deviation $\sigma_1 = 5.2$, has a mean $\bar{x}_1 = 81$. A second random sample of size $n_2 = 36$, taken from a different normal population with standard deviation $\sigma_2 = 3.4$, has a mean $\bar{x}_2 = 76$. On testing the hypothesis, at the 0.01 level of significance, that $\mu_1 = \mu_2$ against the alternative $\mu_1 \neq \mu_2$, consider the following questions:

(38) The test is:

(A) one-sided to left	(B**) two-sided**	(C) one-sided to right	(D) O.W

(39) The critical value (the reliability coefficient) for that test is:

(A) 1.56	(B) 1.58	(C) 1.96	(D**) 2.575**

(40) The value of the test statistic is:

(A) **4.22**	(B) 2.05	(C) 2.24	(D) 22.40

(41) The decision is:

(A) **reject H_0**	(B) reject H_1	(C) accept H_0 and H_1	(D) O.W

QUESTIONS 42 - 46:

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:

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

(A) 6.6	(B) 11.6	(**C) 10.5**	(D) 5.6

(43) 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:

(44) The suitable test statistic is:

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

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

(A) (-1.65, 1.65)	(B) (-1.96, 1.96)	(C) $(-\infty$, -1.96)	(D) $(-\infty$, -1.65)

(46) The decision is:

(A) Reject H_0	**(B)Don't reject** H_0	(C) Decision is not possible

QUESTIONS 47 - 48:

Suppose that 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 $\hat{p}_A = 0.15$, $\hat{p}_B = 0.11$.

(47) The upper limit of the 95% Confidence Interval for $P_A - P_B$ is

(A) 95	(B) 0.04	**(C) 0.129**	(D) 0.115

(48) To test $H_0 : P_A = 0.17$; $H_A : P_A \neq 0.17$, the value of the test statistic is:

(A) **z = - 0.532**	(B) z =5.6	(C) t = -1.06	**(** D) z =3.5

QUESTIONS 49 - 50:

A simple random sample of n = 6 from a normally distributed population gave the observations:
0.90, 0.97, 1.03, 1.10, 1.04, 1.00.
For the above data, the mean is 1.007 and the standard deviation is 0.068.

(49) 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)**

(50) The reliability factor for a confidence interval based on 99% confidence level and sample size of 8 and when population variance is not known, is:

(A) 3.3554	(B) 2.998	(C) 1.8946	**(D) 3.4995**