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

STAT – 106: Biostatistics
Final Examination
First Semester 1437 – 1438

Student's Name		
Student's Number		
Section's Number		Serial Number **:**
Teacher's Name		

Instructions:

- There are 40 multiple choice questions.
- Time allowed is 120 minutes. (2 *Hours*).
- For each question, put the code of the correct answer in the following table beneath the question number. Please, use capital letters: A, B, C, and D.
- Do not copy answers from your neighbors; they have different question forms.
- Mobile Telephones are **not allowed** in the classroom.

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

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

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

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

Good luck

- Suppose that the hemoglobin levels (in g/dl) of healthy Saudi females are approximately normally distributed with mean of 13.5 and a standard deviation of 0.7. If 15 healthy adult Saudi female is randomly chosen, then:

(1) The mean of $\bar{x}$ ($E(\bar{x})$or $\mu_{\bar{x}}$) is:
(A) 0.7 (B) 13.5 (C) 15 (D) 3.48

(2) The standard error of $\bar{x}$ ($\sigma_{\bar{x}}$) is:
(A) 0.181 (B) 0.0327 (C) 0.7 (D) 13.5

(3) $P(\overline{X} < 14) =$
(A) 0.99720 (B) 0.99440 (C) 0.76115 (D) 0.971

(4) $P(13 < \bar{X} < 14) =$
(A) 0.9972 (B) 0.9944 (C) 0.7615 (D) 0.5231

- A sample of 16 college students were asked about time they spent doing their homework. It was found that the average to be 4.5 hours. Assuming normal population with standard deviation 0.5 hours.

(5) The point estimate for μ is:
(A) 0 hours (B) 10 hours (C)0.5 hours (D) 4.5 hours

(6) The upper limit of 95% confidence interval for μ is:
(A) 4.745 (B) 4.531 (C) 4.832 (D) 4.891

- A random sample of 16 adults drown from a certain population of adults yielded a mean weight of 63 kg with sample variance of 64 kg . Assume that the weights in the population are approximately normally distributed. Do the sample data provide sufficient evidence for us to conclude that the mean weight for the population is different than 59 kg. Use α = 0.05.

(7) The hypothesis is:
(A) $H_0: \mu \geq 59,\ H_A: \mu < 59$ (B) $H_0: \mu \leq 59,\ H_A: \mu > 59$
(C) $H_0: \mu \neq 59,\ H_A: \mu = 59.$ (D)$H_0: \mu = 59,\ H_A: \mu \neq 59$

(8) The computed value of the test statistic is:
(A) 7.2 (B) 2.0 (C) 0.5 (D) 1.6

(9) Your decision is:
(A) Accept H_0. (B) Reject H_0

(10) The 99% confident interval for mean μ is
(A) (57.84 , 68.16) (B) (59.08 , 66.92) (C) (58.34,67.66) (D) (57.11 , 68.89)

➢ A researcher was interested in comparing the mean score of female students μ_1, with the mean score of male students μ_2 in a certain test. Assume the populations of score are normal with equal variances. Two independent samples gave the following results:

	Female	male
Sample size	$n_1 = 5$	$n_2 = 7$
Mean	$\bar{x}_1 = 82.63$	$\bar{x}_2 = 80.04$
Variance	$s_1^2 = 15.05$	$s_2^2 = 20.79$

(11) The point estimate of $\mu_1 - \mu_2$ is:
(A) 2.63 (B) -2.37 (C) 2.59 (D) 0.59

(12) The estimate of the pooled variance (s_p^2) is:
(A) 17.994 (B) 18.494 (C) 17.794 (D) 18.094

(13) The upper limit of the 95% confidence interval for $\mu_1 - \mu_2$ is :
(A) 26.717 (B) 7.525 (C) 7.153 (D) 8.2

(14) The lower limit of the 95% confidence interval for $\mu_1 - \mu_2$ is :
(A) -21.54 (B) - 2.345 (C) - 3.02 (D) -1.973

- **In the same question, test at level $\alpha = 0.05$ the doubt that μ_1 and μ_2 are different, then**

(15) The hypotheses are :
(A) H_o: $\mu_1 = \mu_2$, H_A: $\mu_1 \neq \mu_2$ (B) H_o: $\mu_1 = \mu_2$, H_A: $\mu_1 < \mu_2$ (C) H_o: $\mu_1 < \mu_2$, H_A: $\mu_1 > \mu_2$ (D) H_o: $\mu_1 \leq \mu_2$, H_A: $\mu_1 > \mu_2$

(16) The value of the test statistic is:
(A) 1.3 (B) 1.029 (C) 0.46 (D) 0.93

(17) The acceptance region (AR) of H_0 is:
(A) $(2.2281, \infty)$ (B) $(-\infty, -2.2281)$
(C) (-2.2281, 2.2281) (D) (-1.96, 1.96)

(18) The decision is:
(A) Reject H_0 (B) Do not reject (Accept) H_o
(C) Accept both H_o and H_A (D) Reject both H_o and H_A

➢ A standardized chemistry test was given to 50 girls and 75 boys. The girls made an average of 84, while the boys made an average grade of 82. Assume the population standard deviations are 6 and 8 for girls and boys respectively. To test the null hypothesis $H_0: \mu_1 - \mu_2 \leq 0$ against the alternative hypothesis $H_A: \mu_1 - \mu_2 > 0$ at 0.05 level of significance:

(19) The standard error of $(\bar{X}_1 - \bar{X}_2)$ is
(A) 0.2266 (B) 2 (C) 1.5733 (D) 1.2543

(20) The value of the test statistic is:
(A) -1.59 (B) 1.59 (C) 1.25 (D) 4.21

(21) The rejection region (RR) of H_0 is:
(A) $(1.645, \infty)$ (B) $(-\infty, -1.645)$
(C) $(1.96, \infty)$ (D) $(-\infty, -1.96)$

(22) The decision is:
(A) Reject H_0 (B) Do not reject (Accept) H_o
(C) Accept both H_o and H_A (D) Reject both H_o and H_A

➢ In a sample of 80 Corona patients, the proportion of survived patients was 0.304. Test if the proportion of survived patient is more than 0.3. Use $\alpha = 0.1$.

(23) The point estimate of P is equal to:
(A) 0.25 (B) 0.80 (C) 0.304 (D) 0.3

(24) The reliability coefficient ($z_{1-\frac{\alpha}{2}}$) is:
(A) 1.96 (B) 1.645 (C) 2.02 (D) 1.35

(25) A 90% confidence interval for P is:
(A) (0.3410,0.4421) (B) (0.2194,0.3886) (C) (0.2379,0.3701) (D) (0.1293,0.3707)

(26) The hypotheses are:
(A) $H_o: p \geq 0.3$, $H_A: p < 0.3$ (B) $H_o: p \leq 0.3$, $H_A: p > 0.3$ (C) $H_o: p > 0.3$, $H_A: p = 0.3$ (D) $H_o: p < 0.3$, $H_A: p \geq 0.304$

(27) The value of test statistic is:
(A) 1.96 (B) 0.9 (C) 0.078 (D) 1.65

(28) The value of P-value is

(A) 0.078 (B) 0.9362 (C) 0.4681 (D) 0.531

(29) The decision is:
(A) Reject H_o (B) Do not Reject (Accept) H_o
C) Accept both H_o and H_A (D) Reject both H_o and H_A

- In a study, it was found that 31% of the adult population in a certain city has a diabetic disease. 100 people are randomly sampled from the population. Then

(30) The mean for the sample proportion ($\mu_{\hat{p}}$ or $E(\hat{p})$) is:

(A) 0.04 (B) 0.31 (C) 0.69 (D) 0.002

(31) The variance for the sample proportion is:

(A) 0.04 (B) 0.31 (C) 0.69 (D) 0.002

(32) $P(\hat{p} > 0.4) =$

(A) 0.02619 (B) 0.02442 (C) 0.0256 (D) 0.7054

- In a first sample of 100 store customers, 43 used a MasterCard. In a second sample of 100 store customers, 58 used a Visa card. To find the 95% confidence interval for difference in the proportion ($P_1 - P_2$) of people who use each type of credit card?

(33) The point estimate of ($P_1 - P_2$) is

(A)0.43 (B) 0.58 (C)0.15 (D) -0.15

(34) The value of α is :

(A) 0.95 (B) 0.5 (C) 0.05 (D) 0.025

(35) The upper limit of 95% confidence interval for the proportion difference is:

(A) 0.137 (B) -0.013 (C) 0.518 (D) 0.150

(36) The lower limit of 95% confidence interval for the proportion difference is:

(A) – 0.278 (B) 1.547 (C) 0.421 (D) -0.129

- In an experiment comparing two feeding methods (مقارنة طريقتين للتغذية) forCows, eight pairs of twins (توائم)were used- One twin receiving Method Aand the other receiving Method B. At the end of a given time ,the Cows were slaughtered and cooked ,and the meat was rated for its taste(with a higher number indicating a better taste):

Taste score for calves fed								
Twin pair	1	2	3	4	5	6	7	8
Method A	27	37	31	38	29	35	41	37
Method B	23	28	30	32	27	29	36	31

Let $\bar{d} =$ 4.88 ands_d = 2.53 (where d = Method A – Method B). Assuming normality, to test with level α = 0.05 if the Method A increases the taste scores:

(37) The estimate of standard error of ($\bar{d}$) is:

(A) $\frac{\sigma}{\sqrt{n}}$ (B) $\frac{s_d}{n}$ (C) $\frac{s_d^2}{\sqrt{n}}$ (D) $\frac{s_d}{\sqrt{n}}$

(38) The computed value of the test statistic is:

(A) – 5.452 (B) 5.456 (C) 1.929 (D) –1.929

(39) Accept H_0 if (Acceptance region):

(A) $t < 2.3646$ (B) $t \leq 1.895$ (C) $z > 1.645$ (D) $t > 1.895$

(40) Conclusion is

(A) Reject H_o (B) Do not reject (Accept) H_o

(C) Reject both H_o and H_A (D) No decision

➢ --

End of the questions