College of Sciences
Department of
Statistics and Operations

كلية العلوم
قسم الإحصاء وبحوث
العمليات

جامعة
الملك سعود
King Saud University

Second Midterm Exam

Monday, April 10, 2023	STAT 109	Academic year 1444 H
09:00pm – 10:30 pm	Biostatistics	First Semester

Student's Name		اسم الطالب
ID number		الرقم الجامعي
Section No.		رقم الشعبة
Classroom No.		رقم قاعة الاختبار
Teacher's Name		اسم أستاذ المقرر
Roll Number		رقم التحضير

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Instructions:
- ➢ Switch off your mobile and place it under your seat.
- ➢ Time allowed is 90 Minutes.
- ➢ Do not copy answers from your neighbors. They have different questions forms.
- ➢ Choose the nearest number to your answer.
- ➢ Do not use pencils or red pens.
- ➢ For each question, put the code (Capital Letters) of the correct answer in the following table beneath the question number.

1	2	3	4	5	6	7	8	9	10
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**

⁘ Consider the following Table showing a frequency distribution of weights in a sample of 20 cans of fruits:

Class interval	True Class interval	Midpoint	Frequency	Relative Frequency	Cumulative Frequency
19.2 – 19.4			1		
19.5 – 19.7				0.10	
19.8 – 20.0			8		
			4		

(1) The fifth class interval is:

A	B	C	D
21-21.2	20.4 - 20.6	22.2-22.4	19-20.2

(2) The second true class interval is

A	B	C	D
21-21.35	18.45-18.75	20.45-20.75	19.45 - 19.75

(3) The midpoint of the fourth class interval is:

A	B	C	D
20.4	18.4	20.2	19.2

(4) The frequency of the second class interval is:

A	B	C	D
2	4	3	5

(5) The relative frequency of the fourth class interval is:

A	B	C	D
0.18	0.20	0.21	0.22

(6) The cumulative frequency of the final class interval is:

A	B	C	D
18	22	20	21

⇥ If the number of visits to the clinic made by 8 pregnant women in their pregnancy period is:

<div align="center">

12 15 16 12 15 16 12 14

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Then,

(7) The type of the variable is:

A	B	C	D
Continuous	Discreet	Ordinal	Nominal

(8) The sample mean is:

A	B	C	D
14	15	9	11

(9) The sample standard deviation is:

A	B	C	D
1.421	1.982	1.532	1.773

(10) The sample median is:

A	B	C	D
12.5	14.5	15	13.5

(11) The coefficient of variation is:

A	B	C	D
13.55%	11.22%	12.66%	10.22%

(12) The range is:

A	B	C	D
6	11	4	8

Questions (13 - 15)

(13) Which of the following are examples of measures of dispersion:

A	B	C	D
The sample median	The population variance	The population mean	The population mode

(14) Which of the following are examples of measures of central tendency:

A	B	C	D
the parameter and the statistic	The median and the mode	The range and the variance	The mean and the variance

(15) Which of the following measures describes the value that occurs most often?

A	B	C	D
Mode	Range	Mean	Median

⟩ Suppose that we have two events A and B such that:

$$P(A) = 0.3, \qquad P(B) = 0.4, \qquad P(A \cup B) = 0.6$$

(16) The probability $P(A \cap B)$ equals to:

A	B	C	D
0.7	0.40	0.10	0

(17) The probability $P(A \cap B^c)$ equals to:

A	B	C	D
0.51	0.20	0.40	0.60

(18) The probability $P(A|B^c)$ equals to:

A	B	C	D
0.15	0.12	0.45	0.33

(19) The events A and B are:

A	B	C	D
dependent	disjoint	equal	independent

Questions (20 - 24)

⟩ A group of people is classified by the amount of fruits eaten and the health status:

Fruits Eaten / Health Status	Few (F)	Some (S)	Many (M)	Total
Poor (B)	75	30	15	120
Good (G)	17	102	37	156
Excellent (E)	24	104	84	212
Total	116	236	136	488

If one of these people is randomly chosen give:

(20) The event "(eats Some fruits) and (has good health) ", is defined as.

A	B	C	D
$F \cup G^c$	$S \cup E$	$F \cup E$	$S \cap G$

(21) What is the probability that a randomly selected person will be eats many fruits or has poor health?

A	B	C	D
0.112	0.321	0. 494	0.561

(22) What is the probability that a randomly selected person will be eats few fruits and has excellent health?

A	B	C	D
0.049	0.032	0. 044	0.061

(23) What is the probability that a randomly selected person will be has not excellent health

A	B	C	D
0.751	0.342	0.566	0.142

(24) What is the probability that a randomly selected person will has good health given that he/she eats some fruits?

A	B	C	D
0.351	0.214	0.714	0.432

Questions (25 - 26)

▸ Suppose that 6 % of the people in a population have cancer and 30% of all the people are poor. Suppose that two events (cancer and being poor) are independent. A person is selected at random from the population.

(25) The probability that the person selected is poor and has a cancer, is:

A	B	C	D
0.018	0.016	0.06	0.012

(26) The probability that the person selected is either poor or has a cancer, is:

A	B	C	D
0.112	0.621	0.342	0.124

Questions (27 - 30)

▸ A medical research team wished to evaluate the effectiveness of a proposed test in diagnosing a particular disease. This test was given to a random sample of 410 patients having the disease and another independent random sample of 690 patients without symptoms of the disease. The results are as follows

Test Result	Disease		Total
	Yes (D)	No ($\bar{D}$)	
Positive (T)	360	40	400
Negative ($\bar{T}$)	50	650	700
Total	410	690	1100

(27) What is the probability of false positive result?

A	B	C	D
0.058	0.014	0.018	0.012

(28) The sensitivity of the test is:

A	B	C	D
0.458	0.645	0.754	0.878

(29) The specificity of the test is:

A	B	C	D
0.758	0.942	0.454	0.124

(30) **If the rate of the disease in the general population is 0.05**, then the predictive value negative of a screening test

A	B	C	D
0.993	0.846	0.753	0.654