بسم الله الرحمن الرحيم

جامعة الملك سعود
King Saud University

Biostatistics (Stat 109)
Midterm 1 (first semester 441)
2/3/1444-28/9/2022

Time: 1.5 hours

Instructions:
- Write your full name clearly in ARABIC.
- Calculator is permissible.
- Write your answers in questions using upper case (A, B, C, D)
- Only one answer is acceptable; two answers for the same questions are not allowable.

الرقم الجامعي:	اسم الطالب:
الرقم التسلسلي في كشف الحضور:	أستاذ المقرر:

Total mark = $\frac{}{30}$

This is the exam's cover page and you must write your correct answer for each question in the following table.

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

Questions 1 - 3:

1. In a class, there are 12 boys and 16 girls. One of them is called out by an enroll number, what is the probability that the one called is a girl?

A)	**0.57**	B)	0.43	C)	0.35	D)	0

2. A certain county health department has received 25 applications for an opening that exists for a public health nurse. Of these applicants 10 are over 30 and 15 are under 30. Seventeen hold bachelor's degrees only, and eight have master's degrees. Of those under 30, six have master's degrees. If a selection from among these 25 applicants is made at random, what is the probability that a person over 30 or a person with a master's degree will be selected? The answer is equal:

A)	0.72	B)	0.92	**C)**	**0.64**	D)	0.60

3. The Probabilities of three mutually exclusive events A, B and C are given by 1/3, 1/4 and 5/12. Then P (A U B U C) is

A)	0.57	B)	0.43	C)	0.58	**D)**	**1.00**

Questions 4 - 8:

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

Health Status \ Fruits Eaten	Few (F)	Some (S)	Many (M)	Total
Poor (B)	72	31	18	121
Good (G)	23	99	40	162
Excellent (E)	15	85	67	167
Total	110	215	125	450

If one of these persons is randomly chosen give:

4. The probability that the chosen person has poor health and he eats many fruits equals to:

A)	0.513	B)	0.208	C)	0.271	**D)**	**0.040**

5. The probability that the chosen person has good health or he eats some fruits equals to:

A)	0.438	B)	0.326	C)	0.212	**D)**	**0.618**

6. The probability that the chosen person has not good health equals to:

A)	**0.640**	B)	0.437	C)	0.506	D)	0.721

7. Given that the chosen person eats few fruits, the probability that he has excellent health equals to:

A)	0.110	B)	0.320	**C)**	**0.136**	D)	0.360

8. The probability that that the chosen person eats some fruits given that he has poor health equals to

A)	0.611	**B)**	**0.256**	C)	0.405	D)	0.360

Questions 9 - 11:

Consider three events A_1, A_2 and A_3 from a sample space Ω.

9. If the two events A_1 and A_2 are disjoint, then $P(A_1 \cap A_2)$ is equal:

A)	$P(A_1)\,P(A_2)$	**B)**	**Zero**	C)	$1 - P(A_1)$	D)	$P(A_1) + P(A_2)$

10. If the probability of A_2 equals the probability of A_2 given A_3, then A_2 and A_3 are

A)	dependent	B)	disjoint	**C)**	**independent**	D)	exhaustive

11. If A_1, A_2 **and** A_3 are exhaustive and disjoint then $A_1 \cup A_2 \cup A_3$ equals to

A)	**Ω**	B)	Ø	C)	0	D)	$(A_1 \cup A_2 \cup A_3)^c$

Questions 12 - 15:

The following table shows the results of a screening test evaluation in which a random sample of 50 subjects with the disease and an independent random sample of 40 subjects without the disease participated:

	Disease confirmed (D)	Disease not confirmed ($\bar{D}$)	Total
Positive test (T)	35	13	48
Negative test ($\bar{T}$)	15	27	42
Total	50	40	90

12. The sensitivity of the test:

A)	**0.700**	B)	0.643	C)	0.729	D)	0.556

13. The specificity of the test:

A)	**0.675**	B)	0.325	C)	0.729	D)	0.556

Suppose that the probability of the disease in the population equals to 0.254.

14. The predictive value positive of the test:

A)	0.675	B)	0.325	**C)**	**0.423**	D)	0.556

15. The predictive value negative of the test:

A)	0.325	**B)**	**0.869**	C)	0.729	D)	0.556

Questions 16 - 20:

Consider the following data representing the weights (Kg) and the heights (cm) of 10 students:

Weights:	55	60	45	70	75	85	65	60	70	65
Heights:	155	160	145	170	175	185	165	160	170	165

16. The mean of the sample weights equals to:

A)	60	B)	70	**C)**	**65**	D)	55

17. The standard deviation of the sample weights equals to:

A)	**11.05542**	B)	122.2222	C)	12.3596	D)	144.3587

18. The median of the sample heights equals to:

A)	160	B)	170	**C)**	**165**	D)	155

19. The variance of the sample weights equals to:

A)	11.05542	**B)**	**122.2222**	C)	12.3596	D)	144.3587

20. The relative reliability variability (R.V.) of the weights is ………the R.V. of the heights:

A)	**more than**	B)	less than	C)	equal to	D)	None of theses

Questions 21 - 26:

21. If each element in the population has the same chance to be selected in the sample, then the sample is called

(A)	**simple random sample**
(B)	sample space
(C)	stratified sample
(D)	complete sample

22. Which one of the following variables is qualitative?

(A)	number of family members
(B)	**social level**
(C)	family expenditure in thousand SR
(D)	doctor's years of experience

23. The age of a family member in year is

(A)	ordinal qualitative variable
(B)	discrete quantitative variable
(C)	nominal qualitative variable
(D)	**continuous quantitative variable**

24. The appropriate measure of dispersion for one data is:

A)	**standard deviation**	B)	range	C)	variance	D)	Coefficient of variation

Questions 25-26:

One of the clinics specialized in the treatment of obesity includes 2500 medical files for people with this disease. A group of 80 files were chosen randomly, and it was found that the mean of weights for this group at the beginning of treatment was 105 kg.

25. The sample size is

A)	**80**	B)	105	C)	2500	D)	2024

26. The population size is

A)	80	B)	105	**C)**	**2500**	D)	2024

Questions 27 - 30:

The following table gives the distribution of the ages (in year) of a sample of 100 patients who attend a dental clinic.

Ages	Frequency	Cumulative frequency	Relative frequency	Relative cumulative frequency
10 – 16	32			
17 – 23		50		
24 – 30				0.70
31 – 37	25			
38 – 43				

27. The number of patients who are aged between 17 and 23 years equals to:

A)	15	**B)**	**18**	C)	20	D)	25

28. The number of patients who are aged less than 24 years equals to:

A)	60	**B)**	**50**	C)	85	D)	95

29. The relative frequency of patients who are aged between 38 and 43 years equals to:

A)	**0.05**	B)	0.15	C)	0.20	D)	0.25

30. The relative frequency of patients who are aged more than 30 equals to:

A)	0.70	B)	0.85	**C)**	**0.30**	D)	0.25