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

STAT 106
Final Examination
Second Semester, 1424/25 H

Name of Student: _____   **Student's Number:** _____

Class serial number _____

Teacher's name: Dr_____   **Section 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

31	32	33	34	35	36	37	38	39	40

Marks for final exam	
Marks for the term	
Total	

STAT 106**

Each of the following questions is followed by five options, lettered A to E. Find the correct option and enter it below the question number on the front page.

Ten students took a test in a Statistics course and got the following marks:
6, 2 , 8 , 4 , 10 , 8 , 4 , 6 , 8 , 10 .Use this information to answer Questions 1 - 3

1. The median of the marks is :

        (A) 7   (B) 6   (C) 8   (D) 5   (E) 9

2. The mode of the marks is :

        (A) 10   (B) 7   (C) 5   (D) 6   (E) 8

3.The range of the marks is :

        (A) 8   (B) 6   (C) 4   (D) 7   (E) 5

4. In a certain study of accidents, it was found that the mean number of accidents per month was 8, and the coefficient of variation (CV) was 25%. The standard deviation of the number of accidents per month is.

        (A) 32   (B) 4   (C) 6   (D) 2   (E) 8

The following table gives the ages, in years, of a sample of 25 people. Use the table to answer Questions 5 and 6.

Age(years)	Frequency
15 – 19	2
20 – 24	5
25 – 29	8
30 – 34	7
35 – 39	3
Total	25

5. The mean age is:

        (A) 27.8   (B) 20.4   (C) 25.5   (D) 28.7   (E) 29.2

6. The sample variance is:

(A) 40.6667   (B) 16.34   (C) 32.6667   (D) 15.3333   (E) 17.3333

Suppose that the probability that Ahmed passes a Mathematics course is 0.6, the probability that he passes a Chemistry course 0.5 and the probability that he passes both courses is 0.2. Use this information to answer Questions 7 and 8.

7. The probability that Ahmed passes exactly one of the courses is:

(A) 0.9   (B) 0.1   (C) 0.7   (D) 0.5   (E) 0.6

8. The probability that Ahmed fails both courses is:

(A) 0.1   (B) 0.8   (C) 0.3   (D) 0.2   (E) 0.9

A bag contains 4 red and 6 white balls. All the balls are identical except for colour. Two balls are drawn at random from the bag, one after the other, without replacement. (The first ball is not put back into the bag before the second ball is drawn). Use this information to answer Questions 9 and 10.

9. The probability that both balls drawn are red is:

(A) 0.6667   (B) 0.1333   (C) 0.2500   (D) 0.5000   (E) 0.1200

10. The probability that one of the balls drawn is red is:

(A) 0.4000   (B) 0.2400   (C) 0.5000   (D) 0.2667   (E) 0.5333

Suppose that the number of patients visiting a certain dental clinic in one hour has the Poisson distribution with mean of 2. Use this information to answer Questions 11 - 14.

11. The probability that no patient visits the clinic in a given hour is:

   (A) 0.1353   (B) 0.8353   (C) 0.9353   (D) 0.0353   (E) 0.5353

12. The probability that at least one patient visits the clinic in a given hour is:

   (A) 0.9647   (B) 0.8647   (C) 0.4647   (D) 0.0647   (E) 0.7647

13. The expected number of patients who visit the clinic in 3 hours is:

   (A) 5   (B) 1   (C) 2   (D) 3   (E) 6

14. The probability that 4 patients visit the clinic in 3 hours is:

   (A) 0.8339   (B) 0.5339   (C) 0.1339   (D) 0.9339   (E) 0.7339

Let X denote the number of patients who die at a certain hospital in a day. The following table gives the probability function of X. Use the table to answer Questions 15 and 16 .

x	*0*	*1*	*2*	*3*	*4*
P(X = x)	*0.3*	*0.25*	*0.25*	*0.15*	*0.05*

15. *Find the P(1< X <4) .*

   (A) 0.95   (B) 0.40   (C) 0.70   (D) 0.60   (E) 0.65

16. The expected number of deaths per day in the hospital is:

 (A) 1.0   (B) 2.4   (C) 3.3   (D) 1.7   (E) 1.4

17. The following table gives the cumulative probability distribution of a discrete random variable X.

x	0	1	2	4	6
P(X≤x)	0.2	0.3	0.5	0.8	1.0

Find the P(1 < X <6) .

(A) 0.8   (B) 0.9   (C) 0.7   (D) 0.5   (E) 0.6

18. Let X be a continuous random variable for which   P (X < 2.1) = 0.4, and P(X > 3.5) =0.3.

Find the P(2.1 < X <3.5).

(A) 0.3   (B) 0.5   (C) 0.2   (D) 0.7   (E) 0.4

The following table shows 120 patients classified according to their blood sugar levels and sex . A patient is selected at random from the 120 patients. Use the information in the table to answer Questions 19 – 21.

	Sex	
Blood sugar level	Male (M)	Female (F)
Low (L)	40	20
Normal (N)	30	5
High (H)	10	15

19. The probability that the patient selected is a female and has a high blood sugar level is:

(A) 0.60   (B) 0.125   (C) 0.208   (D) 0.375   (E)   0.25

20. The probability that the patient selected is a male or has a normal blood sugar level is:

(A) 0.25   (B) 0.2917   (C) 0.6667   (D) 0.7083   (E) 0.5

21. If it is known that the patient selected is a female, the probability that she has a low blood sugar level is:

(A) 0.375   (B) 0.7   (C) 0.208   (D) 0.50   (E)   0.125

Let A and B be independent events defined on the same sample space such that $P(A \cup B) = 0.6$, and $P(B) = 0.2$. Use this information to answer Questions 22 and 23.

22. Find the P(A).

  (A) 0.40   (B) 0.30   (C) 0.20   (D) 0.12 (E) 0.50

23. Find the $P(B^c / A)$.

    (A) 0.40   (B) 0.65   (C) 0.12   (D) 0.20 (E) 0.80

24. The value of $Z_{0.7549}$ is:

    (A) 0.3100   (B) 0.7549   (C) 0.2451   (D) 0.7649   (E) 0.6900

25.   If X has the normal distribution with mean 5 and variance 36, the value of x such that
$$P(x < X \le 8) = 0.3170 \text{ is}$$

    (A) 2.18   (B) 0.6915   (C) 3.08   (D) 0.3745   (E) -3.08

The random variable X has the normal distribution with mean 4.8 and standard deviation 0.3. Use this information to answer Questions 26 and 27.

26. *Find the* $P(X > 5.4)$.

    (A) 0.2743   (B) 0.0228   (C) 0.9772   (D) 0.7257   (E) 0.6179

27. *Find the* $P(4.2 \le X \le 5.4)$.

    (A) 0.0228   (B) 0.7257   (C) 0.9544   (D) 0.0456   (E) 0.9772

The heights of students from a certain school are normally distributed with mean 106 cm and standard deviation 8 cm. Use this information to answer Questions 28 and 29.

28. The percentage of the students who have heights between 98 cm and 110 cm is:

(A) 15.87%   (B) 46.72%   (C) 69.15%   (D) 53.28%   (E) 28.35%

29. If 25.14% of the students are less than x cm tall, then the value of x is:

(A) 98.45   (B) 100.64   (C) 108.01   (D) 111.36   (E) 103.99

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 large number of X-rays produced by the X-ray machine. Let Y denote the number of defective X-rays from the sample. Use this information to answer Questions 30 – 33.

30. Find the P($Y \geq 5$).

(A) 0.262   (B) 0.0001   (C) 0.26   (D) 0.1   (E) 0.0016

31. Find the P($Y = 0$).

(A) 0.736   (B) 0.262   (C) 0.137   (D) 0.167   (E) 0.356

32. Find the P($1 \leq Y \leq 4$).

(A) 0.262   (B) 0.167   (C) 0.356   (D) 0.736   (E) 0.561

33. The expected number of defective X-rays in the sample is:

(A) 1.2   (B) 0.98   (C) 0.68   (D) 6.0   (E) 4.8

In a study of the effects of a diuretic, 30 healthy adult males were given single doses of the drug and were closely monitored to determine their urinary output over the next 24 hours. The sample mean urinary output was 3300 milliliters and the sample standard deviation was 500 milliliters. The population mean of urinary output is μ. Use this information to answer Questions 34 – 36.

34. The point estimate of μ is:

(A) 24 *ml*   (B) 110 *ml*   (C) 30 *ml*   (D) 3300 *ml*   (E) 137.5 *ml*

35. An upper limit of a 95% confidence interval for μ is:

(A) 3307.72 *ml* (B) 3450.15 *ml* (C) 3478.92 *ml* (D) 4007.11 *ml*   (E) 3308.00 *ml*

36. A lower limit of a 95% confidence interval for μ is:

(A) 3292.00 *ml* (B) 2670.24 *ml* (C) 3149.85 *ml* (D) 3121.08 *ml*   (E) 3294.28 *ml*

In a study of the incidence of back pains for men aged 50 and over in a certain city, it was found that 20 out of 400 men selected, have back pains. The proportion of men aged 50 and over in the city with back pains is π. Use this information to answer Questions 37 – 39.

37. The point estimate for π is

(A) 400   (B) 50   (C) 0.05   (D) 0.125   (E) 20

38. An upper limit of a 90% confidence interval for π is:

(A) 0.0714   (B) 0.0640   (C) 0.9679   (D) 0.0679   (E) 0.1522

39. A lower limit of a 90%   confidence interval for π is:

(A) 0.0286   (B) 0.0360   (C) 0.0321   (D) 0.9321   (E) 0.0978

40. A random sample of size n = 25 is taken from a population which has the normal distribution with mean 8 and standard   deviation 5. P ($\overline{X}$ >7) is:

(A) 0.1587   (B) 0.8413   (C) 0.9413   (D) 0.4413   (E) 0.3087