

**Department of Statistics and Operation Researches**

**College of Science**

**K. S. U.**

**STAT 106**

**Final Examination (Alternative)**

Name	Number
Section number	Teacher's name

Q. No	Marks
1	
2	
3	
4	
5	
6	
Total	

**Instructions**

- 1-This examination consists of 6 questions. There are 9 pages in all, including the cover page and the normal table.
- 2-The time allowed is 3 hours. Attempt all questions.
- 3-Answer on the page of the question. For additional space, use the back side of the page or the previous page.
- 4- Write down everything and avoid over writing. Simplify your calculation.

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Page 1

Q.1 (a): Put the ( $\checkmark$ ) mark against the statement if it is true and ( $\times$ ) if it false (5 marks)

(1) If  $X$  is a continuous random variable, then  $P(X = 5) = 0$  ( )

(2) For any continuous random variable, we must have  
 $P(X \geq 1) = 1 - P(X < 1)$  ( )

(3) The number of children in a family is a qualitative data. ( )

(4) If  $X$  has a binomial distribution with  $n = 3$  and  $\pi = 0.5$ , then  
 $P(1 < X < 3) = 0.375$  ( )

(5) For any two events  $A$  and  $B$  we must have  $P(A \cup B) = P(A) + P(B)$  ( )

(6) If  $A \subset B$ , then  $P(A/B) = P(A)$  ( )

(7) For two events  $A$  and  $B$ ,  $P(A) = 0.3$  and  $P(A \cap B) = 0.2$ , then  
 $P(\bar{A}) = 0.5$  ( )

(8) If  $X \sim N(\mu, \sigma^2)$ , then  $P(X \geq \mu) = 0.5$  ( )

(9) If  $Y$  has Poisson distribution with variance equal 2, then the mean of  $Y = 2$ . ( )

(10) The variance of data  $a, b, c$  is the same as the variance of data  
 $a+1, b+1, c+1$ . ( )

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Q.1 (b) Fill in the blanks

(5 marks)

(1) If  $Z$  has standard normal distribution and  $P(Z \geq k) = 0.25$ , then  $k = \dots\dots\dots$

(2) If  $X \sim N(\mu, 16)$  and  $n = 4$ , then  $\text{Var}(\bar{X}) = \dots\dots\dots$

(3) For any sample of data, we have  $\sum (X_i - \bar{X}) = \dots\dots\dots$

(4) The mode of 30, 32, 36, 40 and 32 is  $\dots\dots\dots$

(5) If  $P(A) = P(A/B)$ , where  $P(B) \neq 0$ , then  $A$  and  $B$  are  $\dots\dots\dots$

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Q.2 (a): The following are weights (in kg) of 5 students from primary school A  
30, 32, 36, 32, 40

Find

(i) the mean, (1 marks)

(ii) sample variance. (2 marks)

Q.2(b): The following table gives blood glucose levels (in mg/dl) of 40 students from school B

Blood glucose levels in mg/dl	frequency
50- 54	8
55- 59	22
60- 64	10

Find

(i) the mean, (2 marks)

(ii) the variance, (2 marks)

(iii) coefficient of variation. (1 marks)

Q2(c): Determine whether the weights of the students from school A are more variable than blood glucose levels of the students from school B. (2 marks)

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Q3: Suppose that in a certain population, 30% have a high blood pressure ( $H$ ), 25% have a high cholesterol level ( $C$ ) and 10% have both high blood pressure as well as high cholesterol level

(a) Find the probability of event that the person

(i) does not have high cholesterol level, (2 marks)

(ii) has high blood pressure but not high cholesterol level, (2 marks)

(iii) does not have high blood pressure and not the high cholesterol level. (2 marks)

(b) Find the probability that a person has high cholesterol level if we know he has high blood pressure. (2 marks)

(c) Are the events  $\bar{H}$  and  $\bar{C}$  independent? (2 marks)

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Q.4(a): It is known that 20% of adults are diabetic patients. If we select 4 persons at random, what is the probability that we find

(i) exactly 2 diabetic patients out of 4, (1 marks)

(ii) at most 2 diabetic patients out of 4, (2 marks)

(iii) at least 3 diabetic patients out of 4. (2 marks)

Q.4(b): A telephone exchange receives 4 international calls per hour. Assume that the number of calls received per hour follows a Poisson distribution. Find the probability that there will be

(i) no call in the next one hour time, (1 marks)

(ii) at least one call in the next one hour time, (2 marks)

(iii) two calls in the next 30 minutes time. (2 marks)

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Q.5(a): Suppose  $Z$  has a standard normal distribution, find

(i)  $P(Z \geq 1.36)$  (2 marks)

(ii)  $P(1.2 < Z < 2.5)$  (2 marks)

Q.5(b): If  $X$  is  $N(4,100)$ , find

(i)  $P(X > 6)$  (2 marks)

(ii)  $P(4 < X < 20)$  (2 marks)

(iii) the value of  $k$  such that  $P(X \geq k) = 0.1515$ . (2 marks)

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- Q.6 (a): In a sample of 400 patients living in Saudi Arabia who got burnt, the mean period of treatment was 3.45 weeks with variance  $2.25(\text{ weeks})^2$ . If  $\mu$  is the true mean period of treatments of all patients who get burnt in Saudi Arabia, find
- (i) a point estimate of  $\mu$  , (2 marks )
  
  - (ii) a 99% confidence interval of  $\mu$  . (3 marks)

- Q.6 (b): In a sample of 368 children from Riyadh , 46 have not received vaccination.
- (i) Find a point estimate of the children in Riyadh who have not received vaccination ( $\pi$  ). (2 marks )
  
  - (ii) Obtain 95% confidence interval for  $\pi$  . (3 marks)