

Tutorial letter 013/0/2021

Descriptive Statistics and Probability STA1501

Year module

Department of Statistics

Assignment 3 Questions

ASSIGNMENT 03
Fixed closing date: 30 July 2021

Please study Chapters 7 and 8 and corresponding parts of the study guide before answering the following questions.

QUESTION 1

Random variable X has the following probability distribution.

x	0	1	3	4	5	6
$P(X = x)$	0.1	0.1	0.3	0.2	0.1	0.2

- (a) Find $P(3 \leq X \leq 5)$. (3)
 - (b) Find $E(X)$. (5)
 - (c) Find $Var(X)$ (7)
- [15]**

QUESTION 2

Assume that 20% of cars travelling on a motorway are grey in colour.

- (a) Find the probability that out of the next 10 cars passing a certain point on the motorway, at least 5 are grey. (8)
 - (b) Find the probability that for the following 5 cars to pass the point, none are grey. (6)
 - (c) If the colours of 25 cars passing on the motorway are recorded, what is the expected number and the variance of the number of grey cars? (6)
- [20]**

QUESTION 3

The amount of time it takes for a steak order to be prepared at an expensive restaurant is uniformly distributed between 10 and 60 minutes.

- (a) What is the probability that a steak order is prepared in less than 20 minutes? (5)
 - (b) What percentage of steak orders take more than 55 minutes to prepare? (5)
 - (c) What is the standard deviation of the time taken for a steak order to be prepared? (5)
- [15]**

QUESTION 4

The time between customers arriving at a book store is exponentially distributed with a mean of 5 minutes.

- (a) What is the probability that no customers arrive during a 30-minute period? (5)
- (b) If the store opens at 9:00, what is the probability that the first customer of the day arrives between 9:10 and 9:20? (6)
- (c) If the store opens at 9:00, what is the probability that the first customer arrives at exactly 9:15? (4)

[15]**QUESTION 5**

Let the number of rainy days per month in a town has Poisson distribution with a mean of 3. Find the probability of the following events:

- (a) There will be one rainy day in one month. (2)
- (b) There will be at least two rainy days in one month. (6)
- (c) There will be no rain for three consecutive months. (4)
- (d) One month of no rain is followed by one month during which it rains on 10 days. (8)

[20]**QUESTION 6**

Assume that the height of South African adult males has normal distribution, with an average of 166 cm and a standard deviation of 9 cm.

- (a) What percentage of South African adult males are between 156 cm and 176 cm in height? (4)
- (b) Find the first and third quartiles of the height distribution of South African adult males. (8)
- (c) A bed manufacturer wants to make a bed long enough to fit at least 99% of South African adult males. What is the height of the tallest person they should accommodate to achieve this? (8)

[15]**Total marks: [100]**