

QQQ – Further Statistics 1 – Chapter 2 – Poisson Distributions (Version 1)

Total Marks: 23

(23 = Platinum, 21 = Gold, 18 = Silver, 16 = Bronze)

1. The discrete random variables W , X and Y are distributed as follows

$$W \sim B(10, 0.4)$$

$$X \sim \text{Po}(4)$$

$$Y \sim \text{Po}(3)$$

(a) Explain whether or not $\text{Po}(4)$ would be a good approximation to $B(10, 0.4)$ (1)

(b) State the assumption required for $X + Y$ to be distributed as $\text{Po}(7)$ (1)

Given the assumption in part (b) holds,

(c) find $P(X + Y < \text{Var}(W))$ (2)

(Total 4 marks)

Edexcel A2 October 2020 Q2

2. Indre works on reception in an office and deals with all the telephone calls that arrive. Calls arrive randomly and, in a 4-hour morning shift, there are on average 80 calls.

(a) Using a suitable model, find the probability of more than 4 calls arriving in a particular 20-minute period one morning. (3)

Indre is allowed 20 minutes of break time during each 4-hour morning shift, which she can take in 5-minute periods. When she takes a break, a machine records details of any call in the office that Indre has missed.

One morning Indre took her break time in 4 periods of 5 minutes each.

(b) Find the probability that in exactly 3 of these periods there were no calls. (2)

On another occasion Indre took 1 break of 5 minutes and 1 break of 15 minutes.

(c) Find the probability that Indre missed exactly 1 call in each of these 2 breaks. (3)

(Total 8 marks)

Edexcel A2 June 2019 Q2

3.

- (a) State two conditions under which a Poisson distribution is a suitable model to use in statistical work. (2)

The number of cars passing an observation point in a 10 minute interval is modelled by a Poisson distribution with mean 1.

- (b) Find the probability that in a randomly chosen 60 minute period there will be
- (i) exactly 4 cars passing the observation point,
 - (ii) at least 5 cars passing the observation point. (5)

The number of other vehicles, other than cars, passing the observation point in a 60 minute interval is modelled by a Poisson distribution with mean 12.

- (c) Find the probability that exactly 1 vehicle, of any type, passes the observation point in a 10 minute period. (4)

(Total 11 marks)