Pearson Edexcel AS Mathematics 8MA0

Statistics – Statistical Distributions

Time allowed: 45 **minutes**

School: www.CasperYC.club

Name:

Teacher:

Question	Points	Score
1	5	
2	4	
3	8	
4	4	
5	6	
6	6	
7	5	
8	12	
Total:	50	

How I can achieve better:

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1. The discrete random variable X has probability function

$$\Pr(X = x) = \begin{cases} k(x^2 - 9), & x = 4, 5, 6 \\ 0, & \text{otherwise} \end{cases}$$

where k is a positive constant.

(a) Show that $k = \dfrac{1}{50}$. [3]

(b) Find the probability distribution of X. [2]

Total: 5

2. The discrete random variable X has probability function

$$\Pr(X = x) = \begin{cases} 0.15, & x = -3, -2 \\ \alpha, & x = -1, 0 \\ 0.1, & x = 1, 2 \\ 0, & \text{otherwise} \end{cases}$$

Find

(a) α [2]

(b) $\Pr(-1 \leq X < 2)$ [1]

(c) $\Pr(X > -2.3)$ [1]

Total: 4

3. The discrete random variable X has probability function

$$\Pr(X = x) = \begin{cases} k(2-x), & x = 0, 1, 2 \\ k(x-2), & x = 3 \\ 0, & \text{otherwise} \end{cases}$$

where k is a positive constant.

(a) Show that $k = 0.25$. [2]

Two independent observations X_1 and X_2 are made of X.

(b) Show that $\Pr(X_1 + X_2 = 5) = 0$. [1]

(c) Find the complete probability function for $X_1 + X_2$. [3]

(d) Find $\Pr(1.3 \leq X_1 + X_2 \leq 3.2)$. [2]

Total: 8

4. Amir and Ed play each other at badminton and for each game, independently of all others, the probability that Amir loses is 0.2. Find the probability that, in 9 games, Amir loses:

   (a) exactly 3 of the games, [2]

   (b) fewer than half of the games. [2]

Total: 4

5. A manufacturer supplies MP3 players to retailers in batches of 20, which are randomly selected. Long-term analysis shows that 5% of the players are faulty.

   (a) Write down a suitable model for the distribution of the number of faulty MP3 players in a batch giving the value(s) of any parameter(s). [2]

   (b) Find the probability that a batch contains no faulty MP3 players. [2]

   (c) Show that the probability of there being more than 4 faulty MP3 players in a batch is equal to 0.0026 to 2 significant figures. [2]

Total: 6

6. Emma throws a fair coin 15 times and records the number of times it shows a head.

   (a) State the appropriate distribution to model the number of times the coin shows a head giving any relevant parameter values. [2]

   (b) Find the probability that Emma records:

      i. exactly 8 heads, [2]

      ii. at least 4 heads. [2]

Total: 6

7. A manufacturer produces large quantities of coloured plates. It is known from previous records that 6% of the production will be blue.

   A random sample of 10 plates was taken from the production line.

   (a) Give the name of a suitable distribution to model the number of blue plates in this sample and state why it is suitable. [2]

   (b) Find the probability that there were more than 2 blue plates in the sample. [3]

Total: 5

8. (a) Write down the conditions under which the binomial distribution may be a suitable model to use in statistical work. [4]

A six-sided die is biased. When the die is thrown the number 5 is twice as likely to appear as any other number. All the other faces are equally likely to appear. The die is rolled repeatedly.

(b) Find the probability that:

i. the first 5 will occur on the sixth throw [5]

ii. in the first eight throws there will be exactly three 5s. [3]

Total: 12