

Lesson 7

A-level Applied Mathematics Statistical Distributions : Year 1

7.1 Old Examination Questions

Question 1

S2 Examination Question from 19th January 2010, Q1

A manufacturer supplies DVD players to retailers in batches of 20.

It has 5% of the players returned because they are faulty.

- (a) Write down a suitable model for the distribution of the number of faulty DVD players in a batch

[2 marks]

Find the probability that a batch contains

- (b) no faulty DVD players

[2 marks]

- (c) more than 4 faulty DVD players

[2 marks]

Question 2

S2 Examination Question from 27th June 2016, Q2

In a region of the UK, 5% of people have red hair.

In a random sample of size n , taken from this region, the expected number of people with red hair is 3.

- (a) Calculate the value of n

[2 marks]

A random sample of 20 people is taken from this region.

Find the probability that;

- (b) (i) exactly 4 of these people have red hair

- (ii) at least 4 of these people have red hair

[5 marks]

Question 3

S2 Examination Question from 15th January 2008, Q2

The probability of a bolt being faulty is 0.3

Find the probability that in a random sample of 20 bolts there are

(a) exactly 2 faulty bolts

[2 marks]

(b) more than 3 faulty bolts

[2 marks]

These bolts are sold in bags of 20.

Sarina buys 10 bags.

(I wonder what she's building ?)

(c) Find the probability that exactly 6 of these
bags contain more than 3 faulty bolts

[3 marks]

Question 4

S2 Specimen Examination Paper, Q3

A manufacturer of chocolates produces 3 times as many soft centre chocolates as hard centred ones. (*sic*)

Assuming that chocolates are randomly distributed within boxes of chocolates, find the probability that in a box containing 20 chocolates there are

(a) equal numbers of soft centred and hard centred chocolates

[3 marks]

(b) fewer than 5 hard centred chocolates

[2 marks]

A large box of chocolates contains 100 chocolates.

(c) Write down the expected number of hard centred chocolates in a large box

[2 marks]

Question 5

S2 Examination Question from 27th June 2003, Q4

- (a)** Write down the conditions under which the binomial distribution may be a suitable model to use in statistical work

[4 marks]

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 thrown repeatedly

Find the probability that

- (b) (i)** the first 5 will occur on the sixth throw

- (ii)** in the first eight throws there will be exactly three 5s

[8 marks]

Question 6

S2 Examination Question from 24th June 2014, Q4

A cadet fires shots at a target at distances ranging from 25 m to 90 m

The probability of hitting the target with a single shot is p

When firing from a distance d m,

$$p = \frac{3}{200} (90 - d)$$

Each shot is fired independently.

The cadet fires 10 shots from a distance of 40 m

(a) (i) Find the probability that exactly 6 shots hit the target

(ii) find the probability that at least 8 shots hit the target

[5 marks]

The cadet fires 20 shots from a distance of x m

(b) Find, to the nearest integer, the value of x if the cadet has an 80% chance of hitting the target at least once.

[4 marks]

Question 7

S2 Examination Question from 27th May 2013, Q7

A telesales operator is selling a magazine.

Each day he chooses a number of people to telephone,

The probability that each person he telephones buys the magazine is 0.1

- (a) Suggest a suitable distribution to model the number of people who buy the magazine from the telesales operator each day

[1 mark]

- (b) On Monday, the telesales operator telephones 10 people
Find the probability that he sells at least 4 magazines

[3 marks]

- (c) Calculate the least number of people he needs to telephone on Tuesday, so that the probability of selling at least 1 magazine, on that day, is greater than 0.95

[3 marks]

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Teachers may obtain detailed worked solutions to the exercises by email from MHHShrewsbury@Gmail.com