Lesson 7

A-level Applied Mathematics
Statistics : Hypothesis Testing : Year 1

7.1 The Binomial Distribution & Hypothesis Testing (Homework)

Question 1

S2 Examination Question from Tuesday 21st January 2008, Q1

(a) Explain what you understand by a census.

[1 mark]

Each cooker produced at GT Engineering is stamped with a unique serial number. GT Engineering produces cookers in batches of 2000.

Before selling them, they test a random sample of 5 to see what electrical current overload they will take before breaking down.

(b) Give one reason, other than to save time and cost, why a sample is taken rather than a census.

[1 mark]

(c) Suggest a suitable sampling frame from which to obtain this sample.

[1 mark]

(d) Identify the sampling units.

[1 mark]

Question 2

S2 Examination Question from Tuesday 21st 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.

John buys 10 bags.

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

[3 marks]

Question 3

S2 Examination Question from Tuesday 21st January 2008, Q5

Dhriti grows tomatoes. Over a period of time, she has found that there is a probability 0.3 of a ripe tomato having a diameter greater than 4 cm.

She decides to try a new fertiliser.

In a random sample of 40 ripe tomatoes, 18 have a diameter greater than 4 cm. Dhriti claims that the new fertiliser has increased the probability of a ripe tomato being greater than 4 cm in diameter.

Test Dhriti's claim at the 5 % level of significance.

State your hypotheses clearly.

[7 marks]

Question 4

S2 Examination Question from Friday 18th January 2013, Q3

A random variable X has the distribution B(12, p)

(a) Given that $p = 0.25$, find

(i) $P(X < 5)$

(ii) $P(X \geqslant 7)$

[3 marks]

(b) Given that $P(X = 0) = 0.05$, find the value of p to 3 decimal places.

[3 marks]

Question 5

S2 Examination Question from Tuesday 17th January 2012, Q2

David claims that the weather forecasts produced by local radio are no better than those achieved by tossing a fair coin and predicting rain if a heads is obtained or no rain if a tail is obtained.

He records the weather for 30 randomly selected days.

The local radio forecast is correct on 21 of these days.

Test David's claim at the 5 % level of significance.

State your hypotheses clearly.

[7 marks]