Daily Question – Applied Mathematics - Day 3

Topic : Binomial Distribution/Hypothesis Testing

Sarah makes clay pots in batches of size n. The clay pots need to be fired in a kiln. Sarah finds that 30% of the clay pots crack when they are fired. The remainder do not crack.

(a) Explain what assumptions need to be made to model with a binomial distribution the number of clay pots in a batch that crack when fired.

(2)

Sarah makes and fires a batch of 8 clay pots.

(b) Write down the expected number of clay pots that crack.

(1)

(c) Find the probability that exactly 2 clay pots crack.

(2)

The probability that at least k clay pots crack is 0.0113

(d) Find the value of k.

(2)

Sarah attends a course to improve her pottery skills. She claims that the course will reduce the proportion of clay pots that crack when fired.

After completing the course Sarah makes a batch of 20 clay pots to assess her claim.

(e) Stating your hypotheses clearly, determine the critical region for the hypothesis test she must use to assess her claim using a 5% significance level.

(3)

(f) Write down the actual significance level of this test.

(1)

(Total for question = 11 marks)