

4C Hypothesis Testing for the Parameter p of a Geometric Distribution

Conditions for a geometric distribution $X \sim \text{Geo}(p)$ to be valid:

Mean of $X \sim \text{Geo}(p)$:

Null hypothesis, H_0 :

Alternative hypothesis, H_1 :

What happens to the mean of $\text{Geo}(p)$ when p increases? Which end of the distribution do you look at?

Useful results: if $X \sim \text{Geo}(p)$,

$$P(X = x) =$$

$$P(X \leq x) =$$

$$P(X \geq x) =$$

1. A company claims that 1 in 8 of their packets of crisps contains a prize ticket. Lee decides to test this claim and he buys a packet of crisps each day until he finds a prize ticket. Lee finds a prize ticket for the first time on the 24th day. Test, at the 5% significance level, whether there is any evidence to suggest that the company is overstating the proportion of packets containing a prize ticket.

2. An electronics company makes small components for use in computers. It claims that the percentage of defective components coming off the production line is 0.05%. The electronics company sells the components to a retailer. The retailer suspects that the percentage defective stated by the electronics company should be higher. From a very large consignment recently purchased, the retailer tests the components until he finds a defective component. He finds a defective component on the 90th component that he tests. Is there any evidence to suggest that the retailer's suspicions are correct? Test at the 5% level of significance.