

4A Testing for the Mean of a Poisson Distribution

When can a Poisson distribution be used as a model?

Null hypothesis, H_0 :

Alternative hypothesis, H_1 :

One-tailed test:

Two-tailed test:

Steps for a hypothesis test for the mean λ of a Poisson distribution:

1. Accidents used to occur at a certain road junction at the rate of 6 per month. The residents petitioned for traffic lights. In the month after the lights were installed there was only one accident. Test, at the 5% level of significance, whether there is evidence that the lights have reduced the rate of accidents.
2. Over a long period of time, Fatima found that the bus taking her to school was late at a rate of 2.5 times per month. In the month following the start of the new summer bus schedules, Fatima finds that her bus is late 6 times. Assuming that the number of times the bus is late each month has a Poisson distribution, test at the 2% level of significance, whether or not the new schedules changed the frequency with which the bus is late.

Using a Poisson approximation to the binomial distribution $B(n, p)$:

3. During an influenza epidemic, 4% of a population of a large city were affected on a given day. The manager of a factory that employs 250 people found that 17 of the employees at his factory were absent, claiming to be suffering from influenza. Using a Poisson approximation to the binomial distribution and a 5% level of significance, test whether or not the proportion of employees suffering from influenza at his factory was larger than that of the whole city.