1 Binomial distribution

$X \sim (n, p)$

1.1 Conditions for binomial distribution

- n repeated trials
- independent trials
- two outcomes
- P is a constant

2 Poisson distribution

2.1 Conditions

- single in space or time
- independent of each other
- at a constant rate

3 PDF and CDF

PDF is $f(x)$, CDF is $F(x)$

3.1 mode

Mode is the x value at which the PDF function has the greatest probability.

3.2 mean

Use formulae provided for PDF.

3.3 median

$F(median) = 0.5$

4 Skewness

symmetrical	$mode = median = mean$
positive skew	$mode < median < mean$
negative skew	$mode > median > mean$

5 Approximation

5.1 Binomial to Poisson

$X \sim B(n, p) \longrightarrow X \sim Po(np)$

5.2 Binomial to Normal

$X \sim B(n, p) \longrightarrow X \sim N(np, npq)$

5.2.1 Conditions

$$\begin{cases} np & > & 5 \\ nq & > & 5 \end{cases}$$

5.3 Poisson to Normal

$X \sim Po(\lambda) \longrightarrow X \sim N(\lambda, \lambda)$

5.3.1 Conditions

$\lambda > 10$

6 Sampling

6.1 Terms

6.1.1 population

a collection of individual items.

6.1.2 sample

a selection of individual members or items from a population.

6.1.3 finite population

each individual member can be given a number.

6.1.4 infinite population

impossible to number each member.

6.1.5 sampling unit

an individual member of a population.

6.1.6 sampling frame

a list of sampling units used in practice to represent a population.

6.1.7 statistic

a quantity calculated solely from the observations in a sample.

6.1.8 sampling distribution

defined by giving all possible values of the statistic and the probability of each occurring.

7 Hypothesis testing

7.1 Terms

7.1.1 hypothesis test

Hypothesis test is a mathematical procedure to examine value of a population parameter proposed by the null hypothesis H_0, compared to the alternative hypothesis H_1.

7.1.2 test statistic

In a hypothesis test the evidence comes from a sample which is summarised in the form of a test statistic.

7.1.3 critical region

The range of values of a test statistic that would lead you to reject H_0.

7.1.4 critical value

The boundary value of a critical region.

7.1.5 one-tailed test

Looks either for an increase or for a decrease in a parameter, and has a single critical value.

7.1.6 Two-tailed test

Looks for both an increase and a decrease in a parameter, and has two critical values.

7.1.7 actual significance level

The probability of rejecting H_0.