BASIC STATISTICS III

CHI SQUARED AND LIKELIHOOD

Individual values of Chi squared – comparison of observed residuals from a model to expected residuals (uncertainties)

$$\chi^2 = \sum_i \frac{(O_i \quad E_i)^2}{\sigma_i^2}$$

These individual values come from an underlying Chi squared probability distribution.

The likelihood of a model given a data set is *proportional to* $e^{-\chi^2/2}$ because we assume the residuals follow normal distributions.

FITTING

- traditional maximum likelihood:
  "best fit" models/parameters
- the right fit for the question
- the Bayesian approach:
  probability *distributions* for models/parameters