

# Testing for goodness of fit

- The probability distribution of the population is not known and needs to be determined.
- The goodness of fit test is a procedure to test that a particular distribution can satisfactorily approximate the true population distribution.
- The test is based on the chi-square distribution.
- Assume there is a sample of size  $n$  from a population whose probability distribution is unknown. Let  $O_i$  be the observed frequency in the  $i$ th class interval and  $E_i$  be the expected frequency in the  $i$ th class interval.
- The test statistic is

$$\chi_0^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i}$$

- The test statistic has a chi-square distribution with  $k-p-1$  degrees of freedom ( $p$ : number of parameters of the hypothesized distribution).
- The hypothesis that the distribution of the population is the hypothesized distribution is rejected if  $\chi_0^2 > \chi_{\alpha, k-p-1}^2$ .