

6C Testing a Hypothesis

Significance level, α :

Critical value, $\chi^2_{\nu}(\alpha)$:

If X^2 exceeds the critical value ...

Watch out: a hypothesis test for goodness of fit is always

1. In an experiment where a dice is rolled 120 times, the frequency distribution is to be compared to a discrete uniform distribution as shown:

Number on dice, n	1	2	3	4	5	6	Total
Observed frequency, O_i	23	15	25	18	21	18	120
Expected frequency, E_i	20	20	20	20	20	20	120
$(O - E)^2/E$							

Test, at the 5% significance level, whether or not the observed frequencies could be modelled by a discrete uniform distribution.

2. Alan has two identical 4-sided spinners with the numbers 1–4 written on each of them. He carries out experiments, where he spins both of his spinners at the same time, and adds the scores together. After 160 experiments, the frequency distribution is as follows:

Number, n	2	3	4	5	6	7	8	Total
Observed by Alan (O_i)	14	11	26	33	42	18	16	160
Expected (E_i)	10	20	30	40	30	20	10	160
$(O - E)^2/E$								

The table also shows the expected distribution of the scores if both spinners are unbiased. Test, at the 2.5% significance level, whether the observed frequencies could be modelled by the expected distribution shown.

3. A school conducted a survey into the impact that a new exercise club was having on students. Prior to the new club starting, 60% of students said they had no regular exercise, 30% reported exercising once a week and 10% reported exercising more than once a week. After the new club started, they surveyed the 150 students to find out how often they exercised.

	No regular exercise	Once a week	More than once a week	Total
Frequency	73	57	20	150

Based on these data, is there evidence of a change in attitude to exercise following the introduction of the new club? Test the data at a 5% significance level.

	No regular exercise	Once a week	More than once a week	Total
Observed	73	57	20	150
Expected				
$(O - E)^2/E$				