Week 9 & 10

Chi-Squared Tests

Learning Outcomes:

- Able to recognise when to use a Chi-square test.
- Able to use Chi-square distribution tables and knows the degree of freedom for each test.
- Able to conduct a test of contingency table and a test for randomness.

Steps

Step 1: Formulate a Hypothesis

Step 2: Determine the Degree of freedom

Step 3: Calculation of χ^2

Step 4: Determine the rejection or acceptance region

Step 5: Conclusions

Example

A company sold its main product by means of placing an advertisement in newspapers A, B and C and asking customers to send in a reply coupon. The company's Directors are interested in the response to press advertisements by age group. The numbers in each age range, analysed by the newspaper from which the coupon was obtained, are given below:

Age range	Newspaper		
	A	B	C
under 30	60	15	25
30-50	15	30	25
50 and over	5	15	10

Examine whether there is any relationship between age range and the newspaper in which the product was advertised.

Solution:

Step 1: Null hypothesis : No relationship between age range and the newspaper.

Alternative : There is a relationship between age range and the newspaper.

Step 2: Degree of freedom = (3-1)(3-1) = 4

From table critical value 5 % = 9.49

Step 3: Calculation of χ^2

$$\chi^2 = \frac{(O-E)^2}{E}$$

$$\chi^2 = 37.182$$

Step 4: The result is highly significant. Reject the null hypothesis.

Step 5: We conclude that there is very strong evidence of a relationship between age range and the newspaper.