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Module 4: Chi-Square Test & Goodness of Fit

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What is Chi-square?

Tests of significance- t, F, Z and chi square (χ^2)

t, F and Z tests are based on the assumptions that the samples are drawn from normally distributed population

Sample means were normally distributed



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What is Chi-square?

Testing procedure requires assumption about the type of population or parameters-parametric test

Alternative technique is non-parametric test

No assumption about the parameters of the population



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What is Chi-square?

Distribution free (can be used with any shape of population distribution)

Relatively easy computation than parametric test

Can be used with types of measurements that prohibit the use of parametric test



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How to Calculate χ^2

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

Where O refers to the observed frequencies

E refers to the expected frequencies



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How to Calculate χ^2

• Step 1- Calculate the expected frequencies

$$E = \frac{RT \times CT}{N}$$

E= Expected frequency

RT= The row total for the row containing the cell

CT= The column total for the column containing the cell

N= The total number of observations



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Step 2
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How to Calculate χ^2

Step 2 take the difference between observed and expected frequencies and obtain the squares of these

Divide the values of $(O - E)^2$ obtained in step 2 by the respective expected frequencies and obtain the total $\sum \frac{(O - E)^2}{E}$



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Example

Gender	Cat	Dog
Men	207	282
Women	231	242

Two hypothesis are:

- Gender and preferences for cats or dogs are independent
- Gender and preferences for cats or dogs are not independent