

2015 Leaving Cert Ordinary Level Official Sample Questions ¹

Question 1

(25 marks)

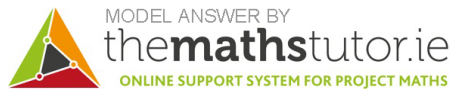
A survey is being conducted of voters' opinions on several different issues.

- (a) What is the overall margin of error of the survey, at 95% confidence, if it is based on a simple random sample of 1111 voters?

The Margin of Error is

$$\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{1111}}$$

Correct to 3 decimal places this is 0.030



- (b) A political party had claimed that it has the support of 24% of the electorate. Of the voters in the sample above, 243 stated that they support the party. Is this sufficient evidence to reject the party's claim, at the 5% level of significance?

The null hypothesis is

H_0 : The percentage of the electorate that support the party is 24% i.e. $p = 0.24$.

The observed proportion is $\hat{p} = \frac{243}{1111} = 0.219$ correct to 3 decimal places.

The margin of error is

$$\frac{1}{\sqrt{1111}} = 0.030$$

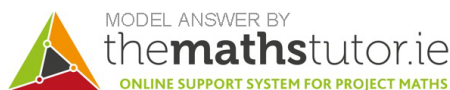
correct to 3 decimal places.

Now

$$|\hat{p} - p| = |0.219 - 0.24| = |-0.021| = 0.021$$

which is **smaller** than the margin of error. Therefore we cannot reject the null hypothesis.

Note that this method is not, strictly speaking, statistically correct. However it is, according to the official syllabus and supporting documentation, deemed to be appropriate by the NCCA and the State Examinations Commission for LCO level. A statistically correct solution requires a method that is specified as LCH level only by the official syllabus.



¹Version 2

Question 2

(25 marks)

- (a) A widget-manufacturing company repeatedly asserts that 80% of traders recommend their brand of widget. In a survey of 40 traders, 24 said that they would recommend the company's widget. Use a hypothesis test at the 5% level of significance to decide whether there is sufficient evidence to reject the company's claim. State clearly the null hypothesis and your conclusion.

H_0 : The percentage of traders that recommend the company's widget is 80%. Or $p = 0.8$.

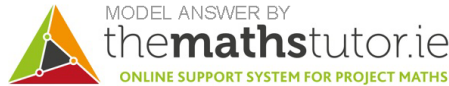
The margin of error is

$$\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{40}} = 0.158$$

correct to three decimal places.

The observed proportion is given by $\hat{p} = 24/40 = 0.6$. Now $|\hat{p} - p| = |0.6 - 0.8| = |-0.2| = 0.2$ which is **bigger** than the margin of error.

Conclusion: We have evidence at the 5% level of significance to reject the company's claim.



- (b) A large group of students has a mean height of 170cm with a standard deviation of 14cm. The heights of these students are normally distributed. Use the empirical rule to find a height interval that will contain the heights of approximately 95% of the students.

The empirical rule says that 95% of the population lies within 2 standard deviations of the mean.

So the required interval is

$$(170 - 2(14), 170 + 2(14)) = (142, 198)$$

In other words, 95% of the students have heights between 142cm and 198cm.

