



Confidence Intervals and Hypothesis Testing



1 Confidence Intervals

1. A sample of the results of 200 Leaving Cert students has a mean of 375 points. The standard deviation of the sample is 90 points. Find the 95% confidence interval for the true mean in relation to Leaving Cert points.
2. A sample of 40 different days in Limerick hospital found on average there was 25 patients waiting on trolleys. The standard deviation of the sample was 3.5. Find the 95% confidence interval of the mean number of patients waiting on trolleys in Limerick hospital.
3. A sample of 350 college students found that on average they spent €40 on alcohol per week. Find the 95% confidence interval for the true mean, if the standard deviation of the sample was €16.
4. A study of 50 people found that the average time it took a person to find a new job was 4 months. If the standard deviation of the sample was 2.9 months, find the 95% confidence interval of the true mean.
5. Find the 95% confidence interval for the mean attendance at Thomond Park for Munster Rugby Games. A random sample of the attendance is shown.

7862	6982	15824
9865	22145	21987
17569	9513	14562
6598	15354	13974
24865	18954	25630
19541	13254	8751
25630	25630	22159
16789	9512	17498
23541	25630	15971
7875	25630	14654

6. A survey of 1500 third level students found that 33% will go abroad this Summer. Find the 95% confidence interval of the true proportion of students who will go abroad this Summer.
7. An survey done by the Department of Social Protection found that in a sample of 1000 unemployed workers, 25% were not interested in retuning to work. Find the





- 95% confidence interval of the true proportion of unemployed workers who do not wish to return to work.
8. A survey of 190 families showed that 111 owned at least one pet. Find the 95% confidence interval of the true proportion of families who own at least one pet.
 9. A survey found that out of 2000 workers, 750 said they spend at least an hour per day on social networks. Find the 95% confidence interval of the population proportion of workers spend at least an hour a day on social networks.
 10. A survey of 500 young teachers (under 30) showed that 35% belonged to a union. Find the 95% confidence interval of the true proportion of young teachers who belong to a union.
 11. A survey of 1000 leaving cert students found that 290 sit higher level maths. Find the 95% confidence interval of the true proportion of leaving cert students who sit higher level maths.

2 Hypothesis Testing

1. A radio station claimed that only 30% of leaving cert students have a part time job. A sample of 200 leaving cert students found that 39% of them had a job. Is there enough evidence to reject the radio stations claim at the 5% significance level.
2. A drug company produces a new drug to help significantly lower cholesterol. The company claims that the drug works 78% of the time. A group of doctors doubted the company's claim. They prescribed the drug for a group of 2500 patients. After one year 1850 of these patients' cholesterol had been significantly lowered by the drug. Test the company's claim that the drug had an 78% success rate, at the 5% significance level.
3. A national newspaper is investigating a claim made by the CEO of a large airline. The CEO claims that 90% of the company's customers are satisfied with the service they received. The newspaper surveyed 500 customers. Among the sampled customers, 441 said they were satisfied with the company's service. Test the CEO's claim, at the 5% significance level.
4. A magazine claims that more than 40% of leaving cert students smoke. A random sample of 2500 leaving cert students found that 1200 students smoked. Test the magazines claim at the 5% significance level.
5. John claims a die is biased towards the number 6. Out of 100 rolls, the number 6 came up 25 times. Is there enough evidence to support John's claim, at the 5% significance level.
6. A casino manager thinks a player is cheating somehow in a game of dice, perhaps by using biased dice. The game involves rolling two dice and adding the scores. If a player rolls a total of 7 or 11 they will win. Out of 50 games, a certain player won 28 times. Test the claim that the player is cheating, at the 5% significance level.





7. A travel company claims that the average cost of a hotel room in Limerick is €65. A researcher selects a sample of 50 hotel rooms and finds that the average cost is €62 with a standard deviation of €12.53. At $\alpha = 0.05$, is there enough evidence to reject the travel company's claim?
8. The director of a multinational company claims that the average hourly wage of the company's factory workers is €12.50 per hour. A sample of 50 employees had a mean hourly wage of €10.50 with a standard deviation of €2.26. At $\alpha = 0.05$, is there enough evidence to reject the directors claim?
9. A reporter suggests that the average attendance at Thomond Park for Munster Rugby games is 20000. Using the data for attendance from the table below, is there enough evidence to reject the reporters claim?

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10. A tyre manufacturer claims that their tyres last for an average of 70000 miles. A random sample of 152 tyres found that they lasted for an average of 63000 miles, with a standard deviation of 15000 miles. Test the manufacturers claim at the 5% significance level.
11. A casino owner claims that the average age of people at the weekly BINGO sessions is 65 years . A sample of 30 BINGO players is selected, and their ages are recorded. Test the owner's claim at the 5% significance level.

59	80	24	61	69	68
53	72	46	65	76	81
80	66	70	61	71	67
52	82	74	39	49	69
32	56	70	74	62	45

12. A politician claims that the average student spends €60 a week on alcohol. A sample of 350 college students found that on average they spent €40 on alcohol per week, with a standard deviation of €26. Test the politician's claim at the 5% significance level.
13. From past records in Limerick maternity hospital, it was found that in the years 2000 to 2010, the average weight of new born babies was 7.1 pounds. A doctor claims that in recent years, newborns are getting bigger and heavier. In 2015, a sample of 80 newborn babies, had a mean weight of 7.5 pounds with a standard deviation of 1.64 pounds. Is there enough evidence to support the doctors claim, at the 5% significance level?





14. A psychologist suggests that teenagers have too many Facebook friends. He claims that the average teenager has 800 Facebook friends. A sample of 250 teenagers, showed an average of 770 friends, with a standard deviation of 293.3. At the 5% significance level, is there enough evidence to reject the psychologists claim?
15. The average IQ is 100 with a standard deviation of 15. A school principal claims that students in his school have a higher than average IQ. A random sample of 30 students from his school had an average IQ of 110 with a standard deviation of 18.5. Is there enough evidence to support the principal's claim, at the 5% significance level?
VIDEO

Leamy Maths Community

