

Suppose the Acme Drug Company develops a new drug, designed to prevent colds. The company states that the drug is equally effective for men and women. To test this claim, they choose a simple random sample of 100 women and 200 men from a population of 100,000 volunteers.

At the end of the study, 38% of the women caught a cold; and 51% of the men caught a cold. Based on these findings, can we reject the company's claim that the drug is equally effective for men and women? Use a 0.05 level of significance.

A car manufacturer aims to improve the quality of the products by reducing the defects and also increase the customer satisfaction. Therefore, he monitors the efficiency of two assembly lines in the shop floor. In line A there are 18 defects reported out of 200 samples. While the line B shows 25 defects out of 600 cars. At α 5%, is the differences between two assembly procedures are significant?

Time magazine reported the result of a telephone poll of 800 adult Americans. The question posed of the Americans who were surveyed was: "Should the federal tax on cigarettes be raised to pay for health care reform?" The results of the survey were:

Non-Smokers	Smokers
$n_1 = 605$	$n_2 = 195$
$y_1 = 351$ said "yes"	$y_2 = 41$ said "yes"
$\hat{p}_1 = \frac{351}{605} = 0.58$	$\hat{p}_2 = \frac{41}{195} = 0.21$

Is there sufficient evidence at the $\alpha = 0.05$ level, say, to conclude that the two populations — smokers and non-smokers — differ significantly with respect to their opinions?

Andrew works in the human resources department of a very large company. He has been given the task of assessing the impact of a new procedure for submitting work expenses claims.

Andrew has been given the following information about claims for **one department** of the company.

In the 6 months **before** the introduction of the new procedure, the number of claims received was 522, of which 43 were rejected because they were submitted incorrectly.

In the 3 months **after** the introduction of the new procedure, the number of claims received was 315, of which 19 were rejected because they were submitted incorrectly.

(a) Using Andrew's data, conduct a test to investigate whether the proportion of claims rejected because they were submitted incorrectly has changed, at the company, since the introduction of the new procedure.

DEFINITION

**** This is a new topic for the new A level course – this means that there is little practice in terms of past paper questions ****

A hypothesis test for the difference of two population proportions requires that the following conditions are met:

- We have two R _____ S _____
- Both from L _____ P _____
 - o Here "large" means that the population is at least 20 times larger than the size of the sample.
- The individuals in our samples have been chosen I _____ of one another.
 - o The populations themselves must also be I _____
- There are S _____ and F _____ in both of our samples

POOLING

When computing a hypothesis test dealing with two populations, we must always remember that the sample variances need to be '**pooled**'

When dealing with a test for two proportions, a '**pooled**' estimate of the proportion is required

$$\text{pooled } p = \frac{(\square \times \square) + (\square \times \square)}{\square + \square}$$

(whilst we will be testing to see if the proportions are different, H_0 will state that they are equal and hence the pooled estimate will be required)

ONE SAMPLE HYPOTHESIS TEST FOR PROPORTION

Variables: _____

H_0 : _____

H_1 : _____

_____ Tailed Test _____ % Sig Level

P_A : _____ n_A : _____

P_B : _____ n_B : _____

Assuming H_0 is true:

Test Statistic : _____

Critical Region: _____

Compare:

Conclude:

Hence we: _____

Therefore there is: _____

Hypothesis Test for Two Sample Proportion Revision Mat

POOLING PRACTICE

Males and females were asked about what they would do if they received a £100 note by mail, addressed to their neighbour, but wrongly delivered to them. Would they return it to their neighbour? Of the 69 males sampled, 52 said yes and of the 131 females sampled, 120 yes. What proportion of the people sampled said yes?

In 2008, of 750 men 20-34 years old, 130 were found to be overweight. Whereas, today, of 700 men, 20-34 years old, 160 were found to be overweight. What proportion of the population were found to be overweight in the last 10 years?

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