PROPORTION SAMPLES

HYPOTHESIS TESTING

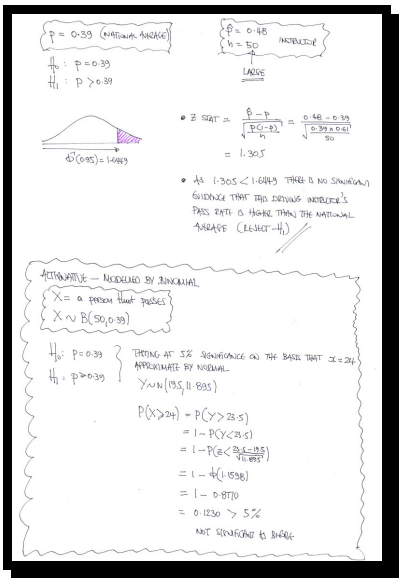
Question 1

Nationally, the proportion of candidates who pass their driving test, on their first attempt, is 39%.

A driving instructor claims his pass rate is higher because from his last 50 candidates 24 passed their test on their first attempt.

Assuming that the 50 candidates of this driving instructor represent a random sample, test, at the 5% level of significance, the instructor's claim.

claim not justified, $1.305 < 1.6449$



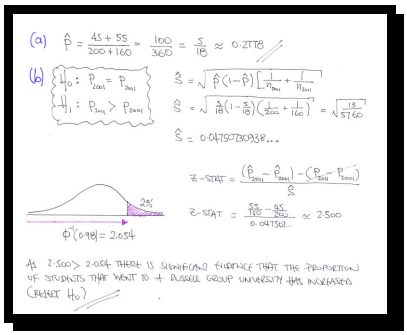
Question 2

An investigation in 2001 into the University destination of the students from the Borough of Eastfield found that in a random sample of 200 students, 45 went to a Russell Group University. In 2011, in a random sample of 160 students from the same borough, 55 went to a Russell Group University.

a) Assuming that the proportion of students who went to Russell Group University has not changed, obtain the best estimate of this proportion.

b) Carry out a test at 2% significance level of whether the proportion of students who went to a Russell Group University has increased from 2001 to 2011.

$\hat{p} = \frac{5}{18} \approx 0.2778$ proportion appears to be higher, $2.500 > 2.054$

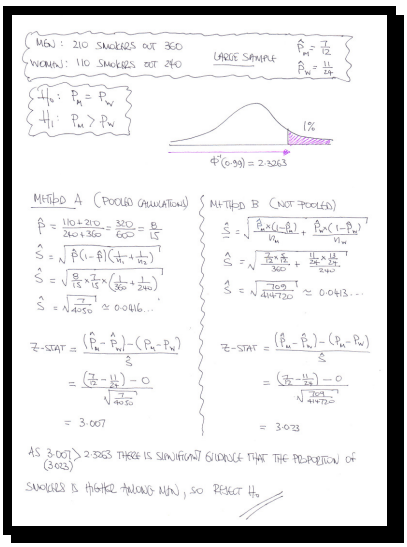


Question 3

In a random sample of 600 people from a certain city there are 360 men of whom 210 are smokers, and 240 women of whom 110 are smokers.

Test, at the 5% level of significance, whether the proportion of smokers in that city is higher among men compared to the proportion of women.

proportion of male smokers appears to be higher, $3.0 > 2.3263$



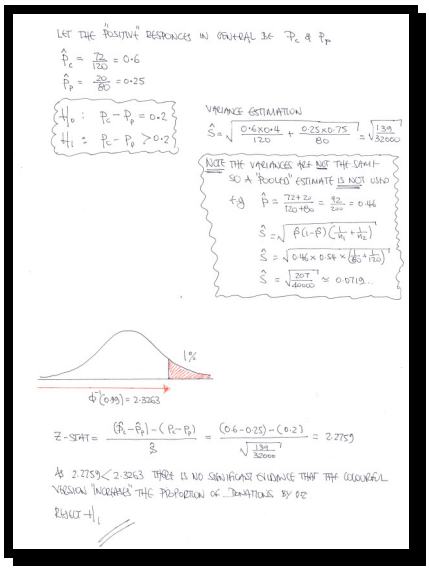
Question 4

One of the methods that a cat rescue charity uses to raise money is by sending letters directly asking for donations. Because of recent poor responses the charity decides to try a "colourful" letter as well as the usual "plain" version.

They send 120 "colourful" letters and 80 "plain" letters. There were 72 donations from the people that received the "colourful" version and 20 donations from the people that received the "plain" version.

Test, at the 1% level of significance, whether the proportion of donations is at least 0.2 higher from the recipients of the "colourful" letter.

not significant, $2.2758 < 2.3263$



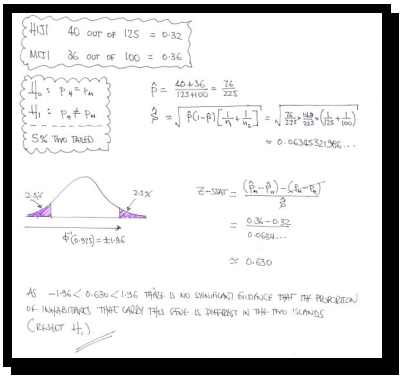
Question 5

A research doctor sampled 125 inhabitants from the island of Hiji and 100 inhabitants from the island of Miji.

It was found that 40 out of the 125 inhabitants from the island of Hiji carry a certain gene. The same gene was carried by 36 out of the 100 inhabitants from the island of Miji.

Test, at the 5% level of significance, whether the proportion of the inhabitants that carry this certain gene is different in the two islands.

proportion does not appear to be different, $-1.96 < 0.630 < 1.96$



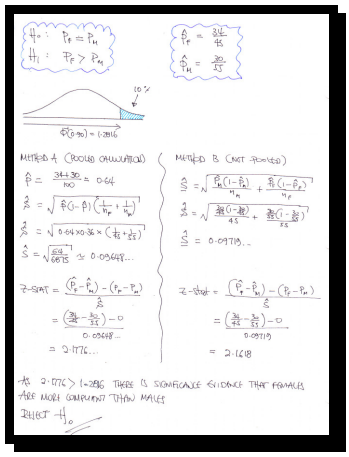
Question 6

A traffic police chief believes that a greater proportion of female drivers than male drivers comply with the speed limit on a certain stretch of road.

	Comply	**Do Not Comply**
Female Drivers	34	11
Male Drivers	30	25

Test, at the 10% level of significance, the traffic police chief's belief .

significant evidence, 2.1776 or $2.1618 > 1.2816$



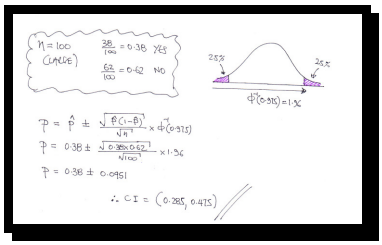
CONFIDENCE INTERVALS

Question 1

An opinion poll is taken to investigate how an electorate will vote in a forthcoming European Referendum. In a random sample of 100 voters 38 indicated that will vote in favour, i.e. a "Yes" vote.

Determine a 95% confidence interval for the proportion of the voters that will vote in favour.

$$\boxed{(0.285, 0.475)}$$

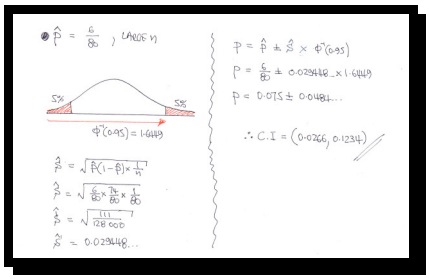


Question 2

A factory machine fills packets of sugar whose nominal weight is $1\,\text{kg}$. Each of a random sample of 80 packets was weighed and 6 packets were found to be underweight. The proportion of all the underweight packets filled by this machine is denoted by p.

Determine a 90% confidence interval for p.

$$\boxed{(0.0266, 0.1234)}$$

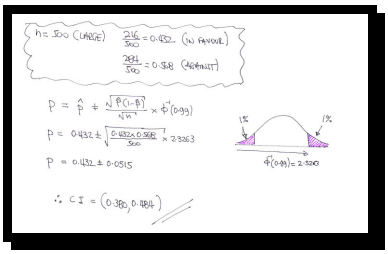


Question 3

A local council recently changed the method of collecting domestic waste. A survey was sent to a random sample of 500 households, of whom 216 were in favour of the new method.

Determine a 98% confidence interval for the proportion of the households that were in favour for the new method collecting domestic waste.

$$\boxed{(0.380, 0.484)}$$



Question 4

A random sample of the members of a club is to be asked for their approval on a certain club matter.

The secretary asks n club members, $n > 50$, of whom a proportion of 0.7 gives their approval on the matter.

A 99% confidence interval for the proportion of members approving the club matter is found **not** to contain 0.85.

Determine the least value of n.

$$\boxed{n = 62}$$

