CONTINGENCY TABLES

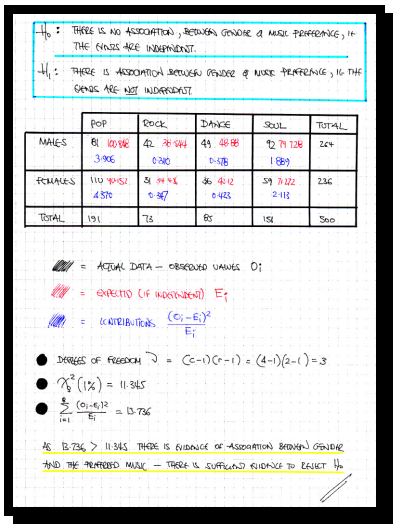
Question 1 (**)

The music preferences of 500 individuals are summarized in the table below.

	Pop	**Rock**	**Dance**	**Soul**
Males	81	42	49	92
Females	110	31	36	59

Use a χ^2 test, at the 1% level of significance, to investigate whether there is any association between the gender and the preferred music.

[ ], [association, $13.736 > 11.345$]



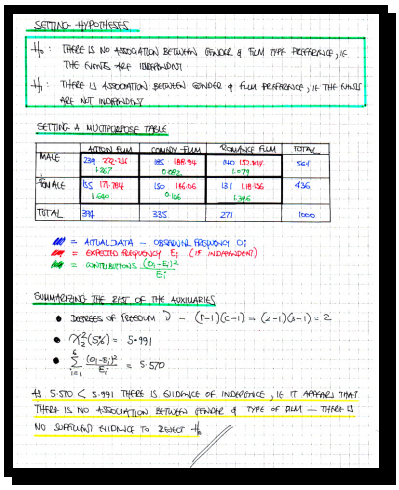
Question 2 (**)

A cinema manager believes that there is an association between the gender of his customers and the type of film they come to watch. The table below shows 1000 viewers in this cinema classified by gender and by the type of film they watched.

	Action Film	Comedy Film	Romance Film
Male	239	185	140
Female	155	150	131

Use a χ^2 test, at the 5% level of significance, to investigate whether there is evidence to support the manager's claim.

[ ], [no association, $5.571 < 5.991$]



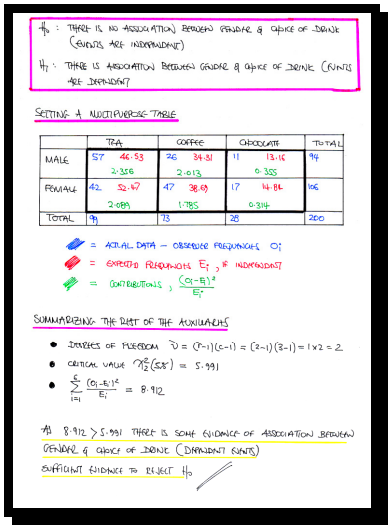
Question 3 (**)

The following table shows a random sample of 200 adults in a Café which ordered tea, coffee or chocolate, classified by gender.

	Tea	Coffee	Chocolate
Male	57	26	11
Female	42	47	17

Use a χ^2 test, at the 5% level of significance, to investigate whether there is any association between the type of drink ordered and gender.

$\boxed{}$, $\boxed{\text{association, } 8.912 > 5.991}$



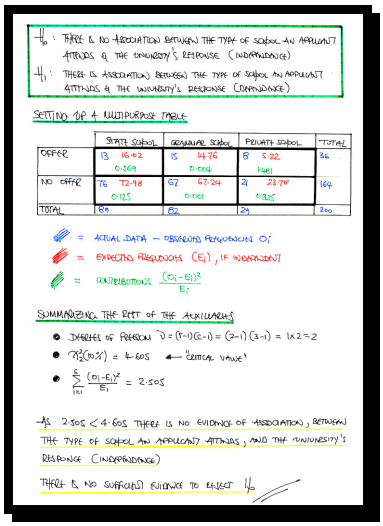
Question 4 (**)

The table below summarizes the response of the University of Dambridge to 200 prospective mathematics applicants, originating from different type of English schools.

	State School	Grammar School	Private School
Offer	13	15	8
No Offer	76	67	21

Use a χ^2 test, at the 10% level of significance, to investigate whether there is any association between the type of school the applicant attends and the response of the University of Dambridge.

$\boxed{}$, $\boxed{\text{no association, } 2.505 < 4.605}$



Question 5 (**)

It is claimed that a new drug is effective in the prevention of sea sickness.

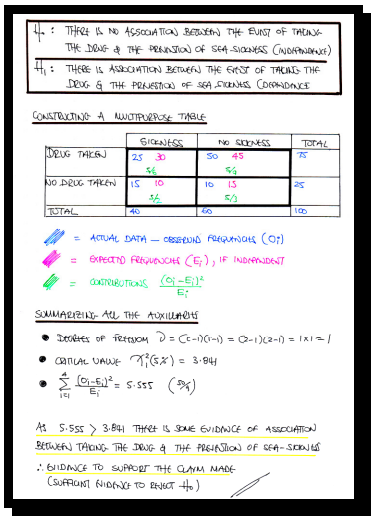
A large number of people that went on boat cruises were surveyed, and the results for a random sample of 100 individuals are summarized in the table below.

	Sickness	**No Sickness**
Drug Taken	25	50
No Drug Taken	15	10

Use a χ^2 test at the 5% level of significance to investigate whether there is evidence to support the claim made.

You may not use a Yates correction in this question.

[ ], [claim justified, $5.555 > 3.841$]



Question 6 **(***)**

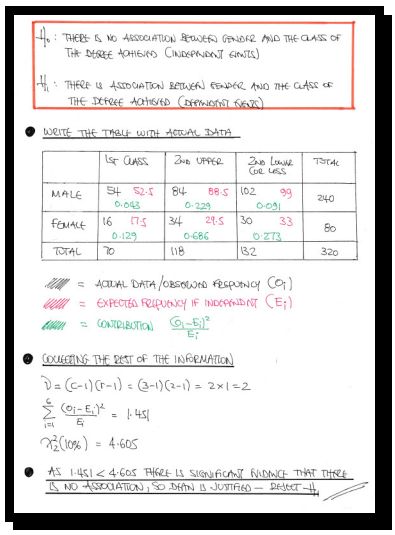
The Dean of a faculty at a London University believes that the gender is independent of the class of the degree achieved.

A random sample of 240 male students and 80 female students were examined and the **percentages for each gender** are summarized in the table below.

	First Class	Second Upper	Second Lower or less
Male	22.5%	35%	42.5%
Female	20%	42.5%	37.5%

Use a χ^2 test, at the 10% level of significance, to investigate whether there is evidence to support the Dean's claim.

[ ], [no association, $1.451 < 4.605$]



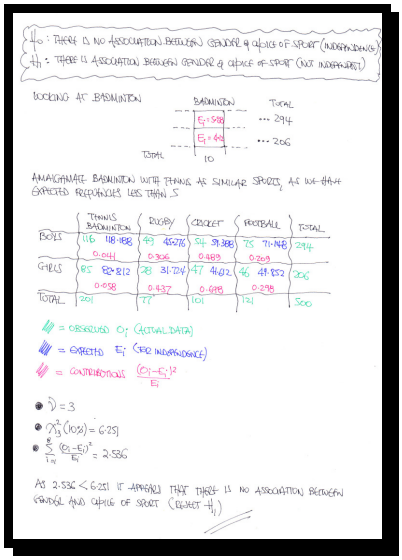
Question 7 (+)**

The activities taken by the students of a school are summarized in the table below.

	Tennis	**Rugby**	**Cricket**	**Badminton**	**Football**
Boys	111	49	54	5	75
Girls	80	28	47	5	46

Use a χ^2 test, at the 10% level of significance, to investigate whether there is any association between the gender and the sport activity taken.

no association, $2.536 < 6.251$



Question 8 (+)**

A new car dealership wants to investigate whether there is an association between the type of engine of car they sell, and the claims made against the warranty they offer to their cars.

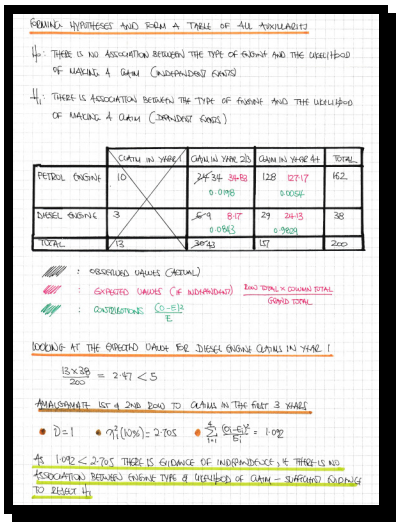
The table below summarizes 200 such claims made, classified by the engine type and by the age of the car.

	Claims in year 1	**Claims in year 2 or 3**	**Claims after year 3**
Petrol Engine	10	24	128
Diesel Engine	3	6	29

Use a χ^2 test, at the 10% level of significance, to investigate whether there is such association.

You need not use the Yates correction formula if you so wish in this question.

[ ] , [no association, $1.092 < 2.705$]



Question 9 (+)**

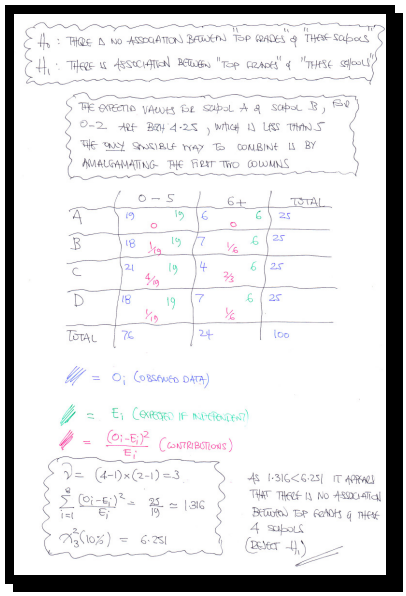
A random sample of 100 pupils from 4 local schools is classified by how many grade A/A^* GCSEs were achieved last year.

	0 – 2	**3 – 5**	**6 +**
School A	4	15	6
School B	1	17	7
School C	6	15	4
School D	6	12	7

Investigate whether there is any association between the number of grade A/A^* GCSEs achieved by students and the local school attended.

Use a χ^2 test, at the 10% level of significance.

no association, $1.316 < 6.251$



Question 10 (+)**

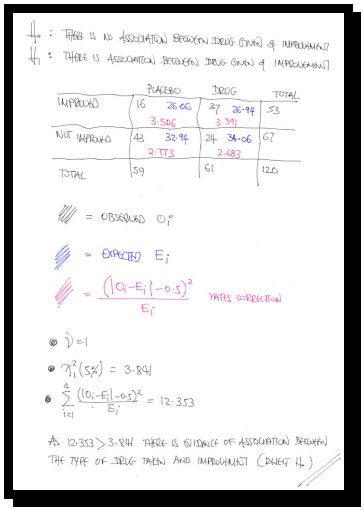
Two groups of patients took part in a clinical trial for a new drug for a certain medical condition. One of the two groups was given the drug whilst the other group was given a placebo, a "fake" drug that has no physical effect in the medical condition.

The results are summarized in the table below.

	Placebo	**Drug**
Condition Improved	16	37
Condition Not Improved	43	24

Use a χ^2 test at the 5% level of significance to investigate whether there is any association between the type of drug patient were given and the improvement or not in their condition.

association, $12.353 > 3.841$



Question 11 (+)**

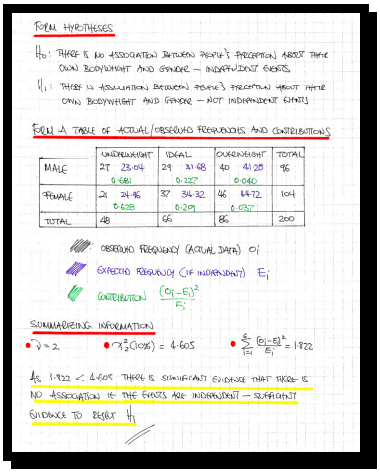
Research is carried out into the people's perception about their own bodyweight.

Subjects are being asked whether they think that they consider themselves overweight, underweight or at an ideal weight and the results are summarized in the table below.

	Underweight	**Ideal Weight**	**Overweight**
Male	27	29	40
Female	21	37	46

Investigate, using a χ^2 test, at the 10% level of significance, whether there is evidence that people's perception about their own bodyweight is independent of gender.

[ ], [no association, $1.822 < 4.605$]



Question 12 (+)**

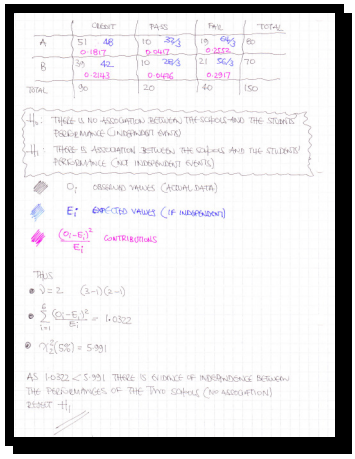
Two schools, A and B, entered their A Level mathematics for a Mathematics Competition of which three different results were possible.

These results are summarized in the table below.

	Credit	**Pass**	**Fail**
School *A*	51	10	19
School *B*	39	10	21

Use a χ^2 test, at the 5% level of significance, to investigate whether there is evidence that the proportions of these results are different between the two schools.

no association, $1.032 < 5.991$



Question 13 (+)**

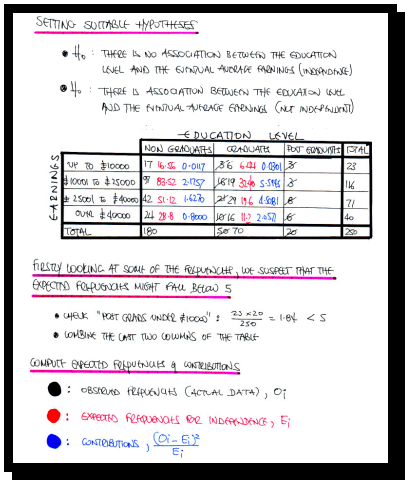
A random sample of 250 employees of a certain town were classified by their level of education and their eventual average annual earnings.

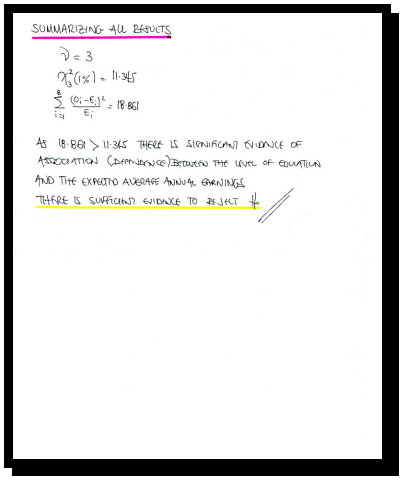
	Non Graduates	**Graduates**	**Post Graduates**
Up to £10000	17	6	3
£10001 to £25000	97	16	3
£25001 to £40000	42	21	8
Over £40000	24	10	6

Use the sample to investigate whether there is any association between level of education and the eventual average annual earnings of the employees.

Use a χ^2 test, at the 1% level of significance.

[ ], [association, $18.861 > 11.345$]





Question 14 (***)

An investigation was carried out to determine the effectiveness of four different blood pressure lowering medications.

Each of the 100 patients who took part in the investigation was given one of the four available medications A, B, C or D.

- 10 of the 17 patients that were given medication A had a positive response.
- 16 of the 26 patients that were given medication B had a positive response.
- 15 of the 28 patients that were given medication C had a positive response.
- 11 of the 29 patients that were given medication D had a positive response.

The following claims are made.

a) Claim 1

Each patient was randomly given one of the four medications.

b) Claim 2

The patient's response is independent of the medication that was given.

Test each of these claims at the 10% level of significance.

claim 1 justified, $3.6 < 6.251$, claim 2 justified, $3.592 < 6.251$

