Pick up the Warm up
but only do #1 and 2
for now.

Have your X^2 packet available (pink color)

Use your notes as needed. $(5-1)$

	red	green	blue	black	silver
$(2-1)$ Male					
female					

Warm Up
Practicing Using the Chi-Square Test of Independence

1. A researcher consulted 500 men and women to see if the colour of the car they drove was independent of gender. The colours were red, green, blue, black, and silver. A χ^2 test was conducted at the 5% significance level and the value found was 8.73.

    a. Write down the null hypothesis **H_0:Color and gendera are independent**

    b. Find the number of degrees of freedom. $(2-1)(5-1) = 4$

    c. Write down the critical value for this test. 9.488

    d. Is car colour independent of gender? Give a clear reason for your answer.

Yes

X^2 of $8.73 < 9.488$

Since the x^2 value of 8.73 is not greater than the critical value (9.488), we fail to reject H_0

Therefore, there is not convincing evidence that there is an association between car color preference and gender.

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2. Suppose a similar test was conducted on a different population of 300 people. A 5% significance level is used. It was found that the p-value was 0.04
Is colour independent of gender ?

$P = .04$

Since the p-value < 0.05, we reject H_0.

Therefore, we have evidence of an association between car color preference and gender

Two Project
Ideas

Aim
for today

The limitations of
the x^2 Test of Independence

A. Not enough data

B. 2×2 adjustment

3.

Consider the contingency table alongside:

a Construct the expected frequency table.

b Are any of the expected frequencies less than 5?

c Combine the data so that none of the cells have an expected frequency less than 5.

Own a pet?

Age	Yes	No
0 - 19	5	3
20 - 29	32	22
30 - 49	42	58
50+	39	34

Regardless of whether you use Method A or B, what are the first three steps of the x^2 test of Independence?

1. Contingency Table/State Hypotheses

2. Calculate Expected Values

3. Check to see if ALL expected values are greater than 5

3.

Consider the contingency table alongside:

a Construct the expected frequency table.

b Are any of the expected frequencies less than 5?

c Combine the data so that none of the cells have an expected frequency less than 5.

Own a pet?

Age	Yes	No
0 - 19	5	3
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Go to step 7 , Method A
(bottom of page)

In a 2 by 2 contingency table:

-- Yate's continuity correction must be used when calculating X^2

If $df = 1$, we use

$$X^2_{calc} = \sum \frac{(|f_o - f_e| - 0.5)^2}{f_e}$$

where $|f_o - f_e|$ is the **absolute value** or **modulus** of $f_o - f_e$

The following table shows the results from a random sample carried out so that the question about the relationship between education and job satisfaction could be analysed.

		Completed University		
		YES	NO	
Satisfied in job	YES	272	618	890
	NO	238	292	530
		510	910	1420

1. Calcuate the expected freq

2. Set up a table to organize.

f_o	f_e	$|f_o - f_e|$	$\dfrac{(|f_o - f_e| - 0.5)^2}{f_e}$
272	319.65		
618	570.35		
238	190.35		
292	339.65		

$$\chi^2_{calc} = \sum \frac{(|f_o - f_e| - 0.5)^2}{f_e} = 29.1$$

Coffee Shop
problem

✓ Data from a coffee shop in London

✓ P3 (look at "simple" and "further" math processes)

Suppose an IB Math Studies
student actually collected
this data

Suppose an IB Math Studies
student actually collected
this data

What type of project could
they create?

- What type of interesting things could be
  investigated?

Ideas

Is age associated with amount of time in a coffee shop.

Pie Chart — To look at distrib. of who is in the coffee shop

Is occupation assoc. with expenditures in coffee

Are Age and $spent correlation.

Look at the distribution of ages (box Plot)

Is occuputon as and length of stay associated?

Ideas

Avg of Age in Coffee

LCQ

OPEN NOTES

Assignment

Ch.11 Packet
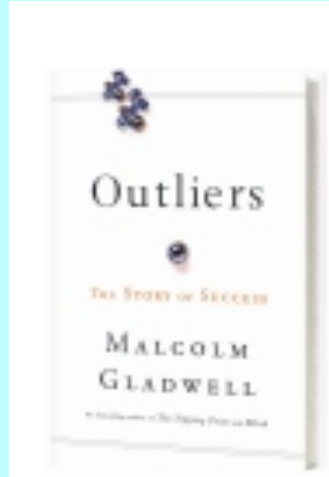
p.341....#2 (use the x^2 statistic)
p.344.... #1abcd
p.348.....#4 (use probability)

clearly show all
steps

A small Pennsylvania town.

Outliers

THE STORY OF SUCCESS

MALCOLM
GLADWELL

· Before Test – Questionnaire

Ed.
of
Parent

Pers.
Views
of
math

Income

120 questions