

HWCheck

① Questions on HW (Except for page 333... #5) ??

② (Also, see your LCQ)

1 Construct an expected frequency table for the following contingency tables:

a

	Likes chicken	Dislikes chicken	sum
Likes fish			60
Dislikes fish			40
sum	75	25	100

EXERCISE 11E.1

1 a

	Likes chicken	Dislikes chicken	sum
Likes fish	45	15	60
Dislikes fish	30	10	40
sum	75	25	100

b

	<i>Drove to work</i>	<i>Cycled to work</i>	<i>Public transport</i>	<i>sum</i>
<i>Male</i>				44
<i>Female</i>				36
<i>sum</i>	46	14	20	80

b

	<i>Drove to work</i>	<i>Cycled to work</i>	<i>Public transport</i>	<i>sum</i>
<i>Male</i>	25.3	7.7	11	44
<i>Female</i>	20.7	6.3	9	36
<i>sum</i>	46	14	20	80

c

	<i>Junior school</i>	<i>Middle school</i>	<i>High school</i>	<i>sum</i>
<i>Plays sport</i>	35	59	71	165
<i>Does not play sport</i>	23	27	35	85
<i>sum</i>	58	86	106	250

c

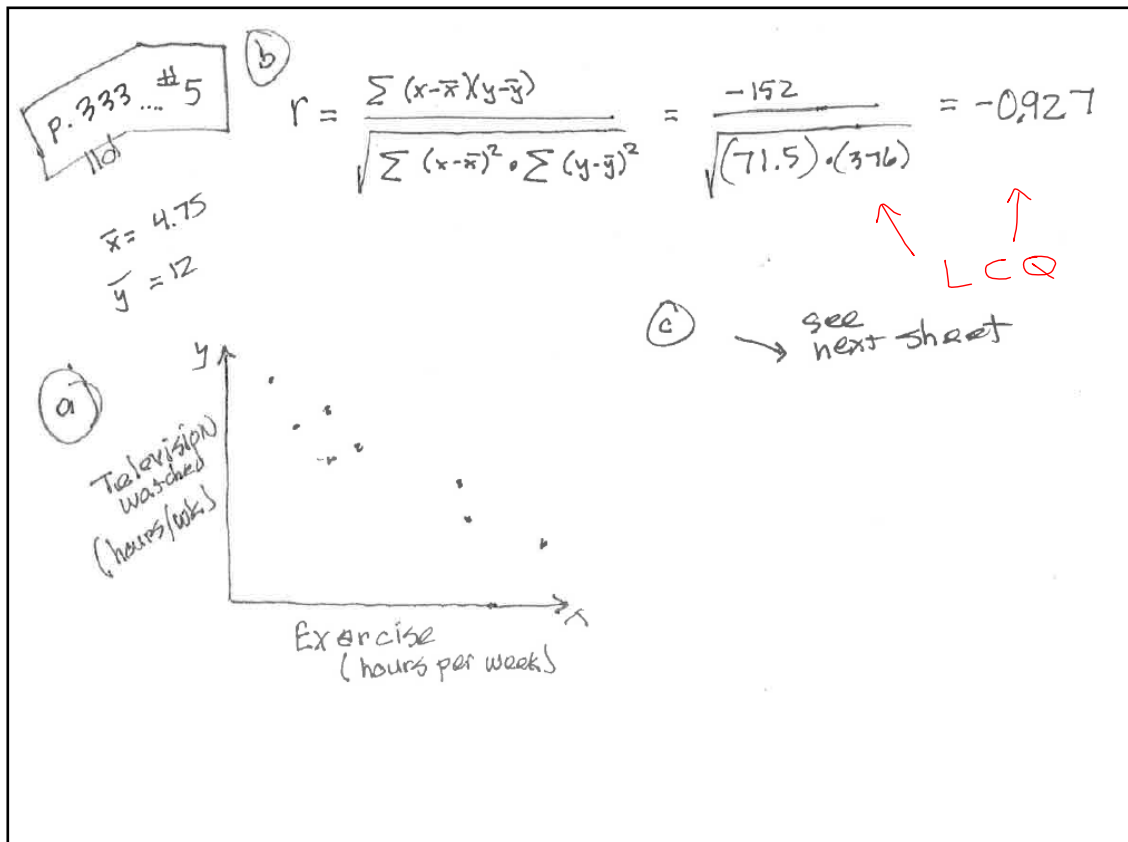
	<i>Junior school</i>	<i>Middle school</i>	<i>High school</i>	<i>sum</i>
<i>Plays sport</i>	38.28	56.76	69.96	165
<i>Does not play sport</i>	19.72	29.24	36.04	85
<i>sum</i>	58	86	106	250

d

	Wore hat and sunscreen	Wore hat or sunscreen	Wore neither	sum
Sunburnt	3	5	13	
Not sunburnt	36	17	1	
sum				

d

	Wore hat and sunscreen	Wore hat or sunscreen	Wore neither	sum
Sunburnt	10.92	6.16	3.92	21
Not sunburnt	28.08	15.84	10.08	54
sum	39	22	14	75



c) Describe the correlation:

There is a strong, negative, linear correlation between exercising and hours watching television.

d) $\bar{x} = 4.75$
 $\bar{y} = 12$

$S_x = 2.9896$

Covariance
 $S_{xy} = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{n}$

$= \frac{-152}{8} = -19$

LCQ
 tomorrow

Equation of
 LSRL


$y - y_i = \frac{S_{xy}}{(S_x)^2} (x - x_i)$

using the mean point
 $(4.75, 12)$

$y - 12 = \frac{-19}{(2.9896)^2} (x - 4.75)$

$y - 12 = -2.13(x - 4.75)$

can convert to
 $y = mx + b$ format
 to check with GDC
 $y = -2.13x + 22.1$

e) 

For every additional hour of Exercise per week, they watch 2.13 hours less of TV per week.

f)
$$y = -2.13x + 22.1$$

$$= -2.13(5) + 22.1$$

$$= 11.45 \text{ or } 11.5 \text{ hours of TV watching at 5 hours of exercise.}$$

Your calculator can also generate the expected values as we'll see later

d

	Wore hat and sunscreen	Wore hat or sunscreen	Wore neither	sum
Sunburnt	3	5	13	
Not sunburnt	36	17	1	
sum				

Schedule

Next class--The full Chi-Square Test of Indep. Process with P-Value

Tuesday- Special Situations + big **LCQ**

Wednesday- Get a list of Unit 2 Test items, continued practice,

Packet P3 (Info on selecting a project and Ideas for project)

Thursday- Evaluate another past project (using the scoring guide) + Use

Computer spreadsheet to calculate r and **LSRL**

Friday - Review Questions + Start Numerical Trigonometry

Monday - Test on Unit 2 (Statistical Applications) ← MON. OCT. 8th

Pick Up
the
Class Notes

read the first 4 slides
and then stop

χ^2

is a statistic that measures the difference between observed values and expected values in a contingency table

Observed
Frequencies

	Regular exercise	No regular exercise	
Male	112	104	216
Female	96	88	184
	208	192	400

EXPECTED
frequencies

	Regular exercise	No regular exercise	sum
Male	$\frac{216 \times 208}{400} \div 112.3$	$\frac{216 \times 192}{400} \div 103.7$	216
Female	$\frac{184 \times 208}{400} \div 95.7$	$\frac{184 \times 192}{400} \div 88.3$	184
sum	208	192	400

If the chi square value that we calculate is big enough, then we can establish a:

linkage between two variables

association between two variables

relationship between the variables

If the variables in this example are, indeed, associated, then gender might have an effect on regular exercise but just being associated or linked does not prove causation.

What you can say is.....

Chi Square Statistic is :

$$\chi^2 = \sum \frac{(f_e - f_o)^2}{f_e} \neq 20.2$$

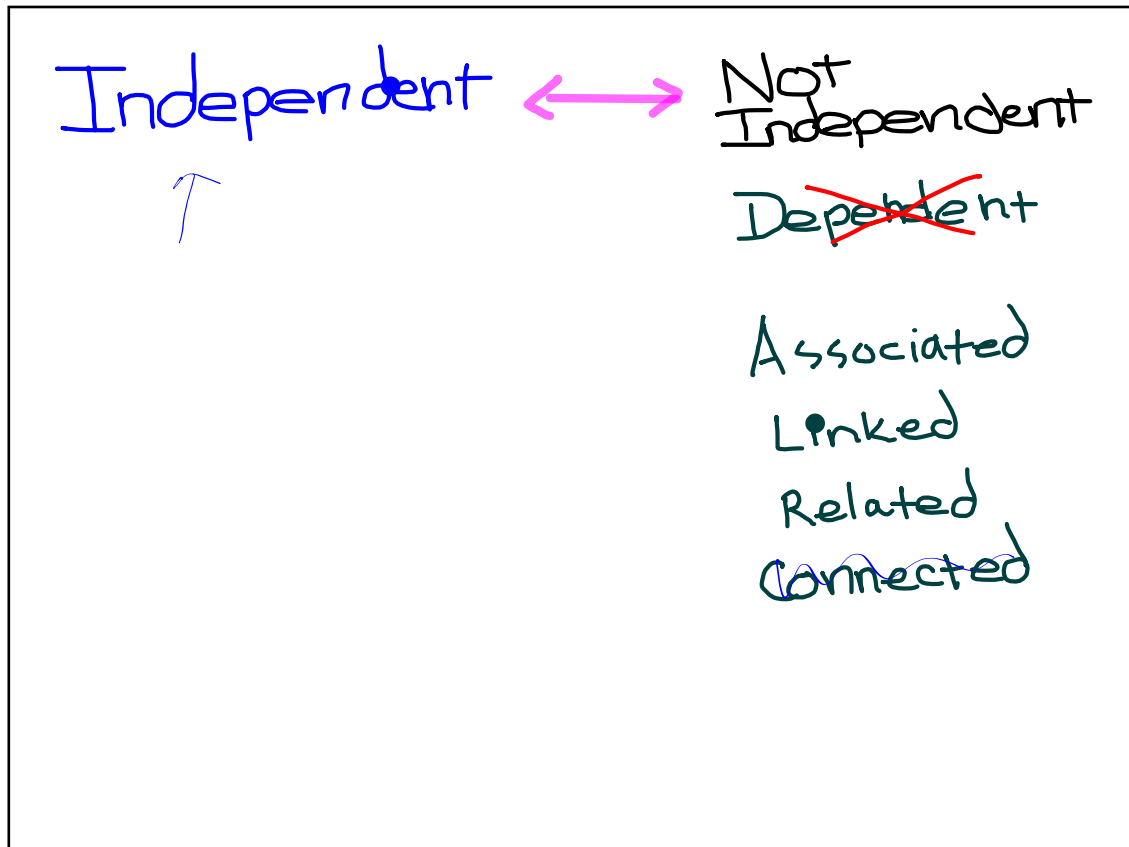
Formula packet

and we compare it to.....

χ^2_{crit}

....the cutoff, or critical Chi-Square Value which is either given to you (or found in a resource table) .

.... which, in turn, will tell us whether to accept or reject the assumed independence between the two variables.



AIM:

Calculate the Chi-Square Statistic,
3 different ways

Carry out the ~~entire~~ **Test of Independence**

Before we go on to a new situation we need to practice calculating χ^2 by using the formula itself.

For this we'll continue to use the same example from yesterday

handout

Once the expected cell frequencies are computed, it is convenient to enter them into the original table as shown below. The expected frequencies are in parentheses.

	Graduated	Failed to Graduate	Total
Experimental	73 (59.042)	12 (25.958)	85
Control	43 (56.958)	39 (25.042)	82
Total	116	51	167

Observed
frequencies

	Graduated	Failed to Graduate	Total
Experimental	73	12	85
Control	43	39	82
Total	116	51	167

Expected
frequencies

	Graduated	Failed to Graduate	Total
Experimental	59.042	25.958	85
Control	56.958	25.042	82
Total	116	51	167

$$\chi^2 = \sum \frac{(f_e - f_o)^2}{f_e}$$

$$= \frac{(59.042 - 73)^2}{59.042} + \frac{(25.958 - 12)^2}{25.958} + \dots =$$

alternative:

$$\chi^2 = \sum \frac{(f_e - f_o)^2}{f_e}$$

f_e	f_o	$(f_e - f_o)$	$\frac{(f_e - f_o)^2}{f_e}$
59.042	73		3.2998
25.958	12		7.5054
56.958	43		↓
25.042	39		

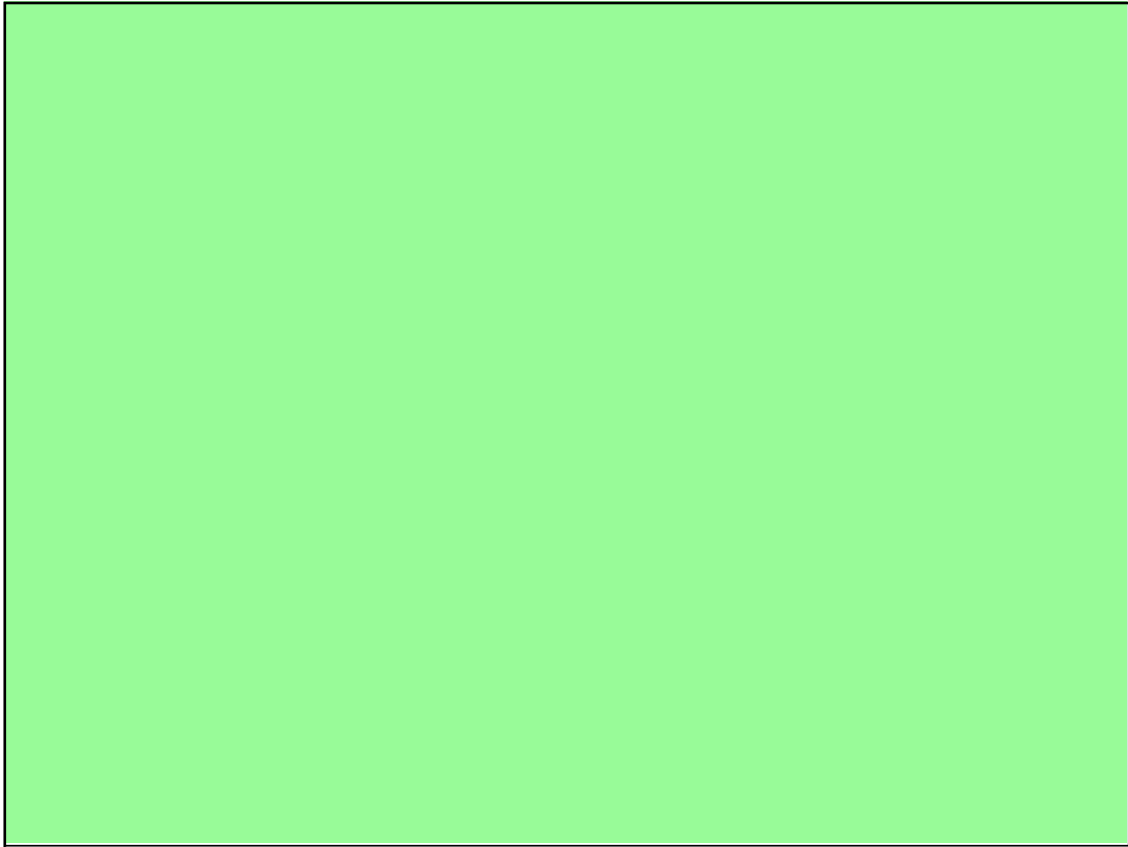
$$\chi^2 \rightarrow 22.0$$

and to calculate χ^2 Uber quickly

Use GDC !!!


SECTION J of
your calculator Basics.

- a. Choose **MATRIX** and go to **EDIT**
 - b. Make sure your matrix is the right size
 - c. Enter your **Observed** values in **Matrix A**
 - d. Choose **STAT** and go to **TESTS**
 - e. Scroll down to **χ^2 -Test** and press **ENTER**
 - f. Choose **Calculate**.
 - g. Your **expected** values can now also be found in **Matrix B**
-



We'll step back and just observe
example of the whole process

(ppt: Chi Square ppt)

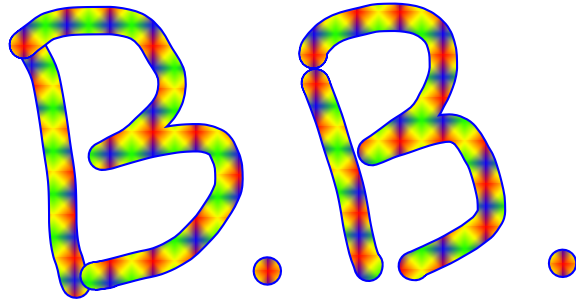
 Chi-Square Test of Independence.pptx

Because of time (Damn Assembly!)
we'll conduct the entire test on Monday

However, I want you to study the
entire process from a packet that
shows an example.

don't lose this
packet.

~ Write your name on it.

The text 'B.B.' is written in a large, stylized font. Each letter is filled with a vibrant rainbow gradient and has a thick blue outline. The letters are separated by a period, and there is another period at the end of the string.

When finished, pick up the notes

1. Once again pick up the project on Teenage pregnancy. Have your Project Scoring Criteria out as well.

2. **Quietly** read Criteria D.

Then score the project *but don't write*
on it.

LCO

Assignment: Ch.11 Packet

- ① Study the Chi-Square Packet *but not part B.*
- ② Practice Problem with Correlation and LSRL by "hand": *handout with Gross Domestic Product and Infant Mortality Rate*

