

Chapter 11 Review Sheet

① 2-Prop Z-Test for χ^2 Test for Homogeneity

$$\alpha = 0.10$$

	Favor	Don't	
Dem	90	60	150
Repub	80	40	120

$$H_0: P_D = P_R$$

True proportion of Dems who support is the same as Repubs.

$$H_a: P_D < P_R$$

True proportion of Dems who support is ~~greater~~ less than Repubs.

SRS - assume for each

Normal $\hat{P}_c = \frac{90+80}{150+120} = \frac{170}{270}$

$$150 \left(\frac{170}{270} \right) = 94.44 \geq 10$$

Dems

$$150 \left(1 - \frac{170}{270} \right) = 55.56 \geq 10$$

$$120 \left(\frac{170}{270} \right) = 75.56 \geq 10$$

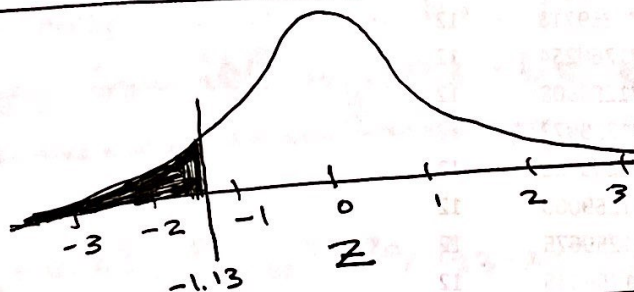
Repubs

$$120 \left(\frac{100}{270} \right) = 44.44 \geq 10$$

$\therefore$ approx. Normal

10% - $N \geq 1,500$ Dems
 $N \geq 1,200$ Repubs

$Z = -1.13$
 $p\text{-value} = 0.13$



Because the p-value of 0.13 is greater than $\alpha = 0.10$, I do not have statistically significant evidence to reject H_0 . Therefore, I cannot conclude that the true proportion of Republicans in favor is greater than Democrats.

② $\alpha = 0.01$

$H_0: P_{\text{white}} = 0.15, P_{\text{blue}} = 0.15, P_{\text{red}} = 0.35, P_{\text{black}} = 0.30, P_{\text{colors (other)}} = 0.05$

H_a : At least one of the true proportions of car colors differs from its hypothesized value.

χ^2 GOF Test

observed	Expected	
140	124.5	white
100	124.5	Blue
270	290.5	Red
230	249	Black
90	41.5	Other colors
830	830	

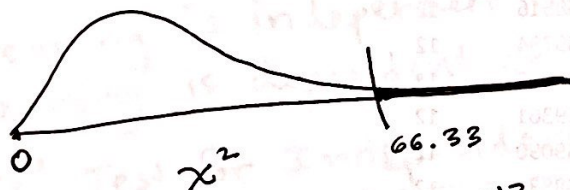
SRS - assume
All expected values ≥ 5 (see table).

$N \geq 8,300$ cars

$\chi^2 = 66.33$

p-value = 1.35×10^{-13}

df = 4



Because the p-value of 1.35×10^{-13} is less than $\alpha = 0.01$, I have statistically significant evidence to reject H_0 . Therefore, at least one of the true proportions of cars stolen differs from its hypothesized value.

③ $\alpha = 0.05$

$H_0: P_{17-18} = 0.25, P_{19-20} = 0.23, P_{21-22} = 0.20, P_{23-24} = 0.15, P_{25-26} = 0.08, P_{\geq 27} = 0.09$

H_a : At least one of the true proportions of adults attending a university differs from its hypothesized value.

χ^2 GOF Test

	Observed	Expected
17-18	270	250
19-20	202	230
21-22	180	200
23-24	160	150
25-26	88	80
≥ 27	100	90
	1,000	1,000

SRS - assume

All expected values ≥ 5 (see table).

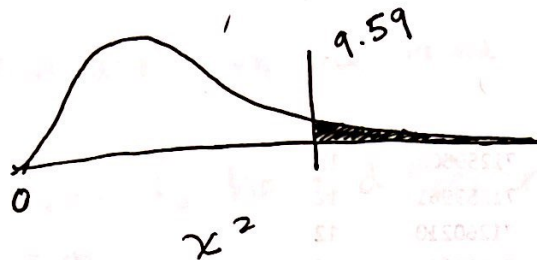
$N \geq 10,000$ university students

③ continued

$$\chi^2 = 9.59$$

$$p\text{-value} = 0.09$$

$$df = 5$$



Because the p-value of 0.09 is greater than $\alpha = 0.05$, I do not have statistically significant evidence to reject H_0 .

Therefore, I cannot conclude that ~~at~~ at least one of the true proportions of adults attending a university differs from its hypothesized value.

④ $\alpha = 0.01$

H_0 : Political leaning is independent of age group.

H_a : Political leaning is dependent on age.

χ^2 Test for Independence

Key: $\begin{array}{|c|} \hline \text{O} \\ \hline \text{E} \\ \hline \end{array}$

SRS - stated

All expected values ≥ 5 (see table). conservative

$N \geq 3,600$ Lamorinda residents

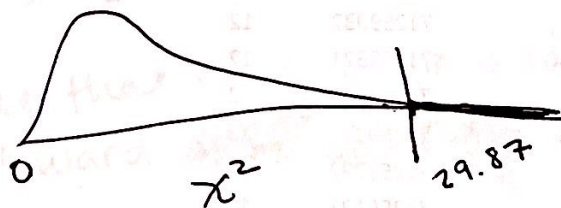
Moderate
Liberal

	20-35	36-50	> 50
Conservative	30 37.5	25 30	35 22.5
Moderate	80 87.5	85 70	45 52.5
Liberal	40 25	10 20	10 15

$$\chi^2 = 29.87$$

$$p\text{-value} = 5.19 \times 10^{-6}$$

$$df = 4$$



Because the p-value of 5.19×10^{-6} is less than $\alpha = 0.01$, I have statistically significant evidence to reject H_0 .
Therefore, there is evidence that political leaning is dependent on age.

⑤ $\alpha = 0.10$

H_0 : Consumers and dentists have the same attitudes toward advertising.

H_a : Consumers and dentists have different attitudes toward advertising.

χ^2 Test for Homogeneity

	SA	A	N	D	SD
C	34 19.302	49 30.076	9 14.364	4 14.364	5 22.893
D	9 23.698	18 36.924	23 17.636	28 17.636	46 28.107

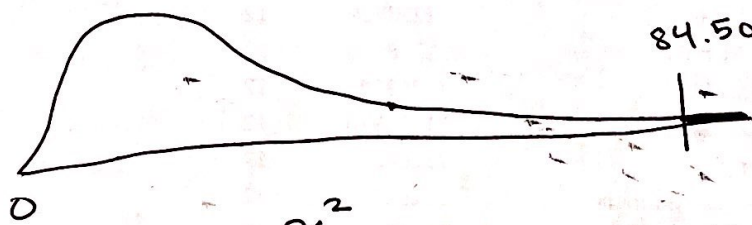
Key: 0 E

SRS - stated for dentists and stated for consumers

All expected values ≥ 5 (see table)

$N \geq 1,010$ consumers and $N \geq 1,240$ dentists

$\chi^2 = 84.50$
 $p\text{-value} = 1.94 \times 10^{-17}$
 $df = 4$



Because the $p\text{-value}$ of 1.94×10^{-17} is less than $\alpha = 0.10$, I have statistically significant evidence to reject

H_0 .

Therefore, I can conclude that consumers and dentists have different attitudes toward ~~advertising~~ advertising.