

Instructions: Show all work. Use exact answers or appropriate rounding conventions. If you use your calculator, you can show work by saying which calculator commands you used.

1. Criminologists have long debated whether temperatures affect crime rates. Analyze the data below with a χ^2 test.

Winter	Spring	Summer	Fall	
328	334	372	327	1361
340.25	340.25	340.25	340.25	

$$\chi^2 = \sum \frac{(obs - exp)^2}{exp} = 4.0345$$

H_0 : no effect
 H_a : seasonal effect

fail to reject
 Seasons don't have a strong effect apparently

$$\chi^2_{cdf}(4.0345, E99, 3) = .25776 > .05$$

2. The number of male children in families with 3 children should be a binomial distribution. Suppose a random sample of 160 families yields the data in the table below. Test the relevant hypothesis to see if it differs markedly from the expected.

Number of Male Children	0	1	2	3	
Frequency	14	66	64	16	160
	$\frac{1}{8} \rightarrow 20$	$\frac{3}{8} \rightarrow 60$	$\frac{3}{8} \rightarrow 60$	$\frac{1}{8} \rightarrow 20$	

$$\chi^2 = \sum \frac{(obs - exp)^2}{exp} = 2.467$$

H_0 : $p =$ binomial distn.
 H_a : not binomial
 fail to reject

$$\chi^2_{cdf}(2.467, E99, 3) = .48128 > .05$$

3. Consider the following data on human lateralization (handedness) whose feet were measured. If the size differed by more than half a shoe size they were divided into greater than or less than groups.

	L>R	L=R	L<R	Sample Size
Men	2	10	28	40
Women	55	18	14	87

Does the data suggest that gender has a strong influence on the development of foot asymmetry? Test the appropriate hypothesis.

use χ^2 -test
 Matrix A

$$\chi^2 = 45.00$$

$$p = 1.689 \times 10^{-10} < .05$$

H_0 : sex has no diff
 H_a : it does
 reject H_0