

Instructions: Show all work. State any formulas used. If you use the calculator, you should say which function you used, and what you entered into it, as well as any output. I can only give partial correct for incorrect answers if I have something to grade.

1. Do crime rates go up in some months? Use the data below to test the hypothesis that they do. Clearly state the null and alternative hypotheses, and your conclusion in the context of the problem.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Crimes	64	45	41	50	42	39	26	55	52	36	46	48

= 544

expected = $45.\bar{3}$

$$\chi^2 = \sum \frac{(obs - exp)^2}{exp} = 23.1055$$

df = 11

$\chi^2 cdf(23.1055, E99, 11)$

= .017

reject H_0 at 5% time of year does appear to influence crime rates.

H_0 : time of the year does not influence crime rates

H_a : time of year does influence crime rates

2. Below is a table of data for the sex of kittens in a sample of litters of 4 kittens. The data collected is below. The number of girls born in each litter should be distributed binomially with $p = 0.5$.

Number of girls in the litter	0	1	2	3	4
Number of litters	5	15	49	22	8

= 99

binomial pdf
 $(4, .5, x) = \pi$

expected

$\pi = .0625$.25	.375	.25	.0625
6.1875	24.75	37.125	24.75	6.1875

$$\chi^2 = \sum \frac{(obs - exp)^2}{exp} = 8.7037 \quad df = 4$$

$\chi^2 cdf(8.7037, E99, 4) = .0689 > .05$ fail to reject H_0

H_0 : fits a binomial distribution

H_a : does not fit a binomial distribution w/ $p = .5$

3. The contingency table below shows data displaying the email and phone providers for a sample of people. Determine if there is a relationship between cell phone provider and email provider, or if the two choices are independent. Clearly state your null and alternative hypotheses and your conclusion in the context of the problem.

		Cell Phone Providers		
		ATT	Verizon	Other
Email Provider	Gmail	28	17	7
	Yahoo	31	26	10
	Other	26	19	11

χ^2 -Test into matrix A

$\chi^2 = 1.587$
 $p = .8253 > .05$

H_0 : The choice of phone provider and email provider is independent

H_a : The choices are dependent.

Fail to reject H_0

The choices are independent.