

Goodness of Fit/Analysis of Variance

Worksheet

1. Three streets in Los Angeles have different tree types - pine, jacaranda, and ash. Counts of three common bird species- house finch, northern mockingbird, and house sparrow - are taken on each of the three streets. Below are are table of counts. Are the bird species preferences independent of the street?

		tree species		
		pine	jacaranda	ash
bird species	house finch	9	9	26
	northern mockingbird	11	16	6
	house sparrow	14	8	7

- (a) Make a segmented bar chart of the conditional distribution of bird species, comparing the three streets.
 - (b) Give a suitable hypothesis to address the question addressed above.
 - (c) Create the “expected” table.
 - (d) Create the table of residuals.
 - (e) Explain how you would compute the χ^2 test statistic from the residual table.
 - (f) Use R to perform the χ^2 test and state your result.
 - (g) Use the table of residuals to state which trees to plant to attract more of each species of birds - house finch, northern mockingbird, and house sparrow. Explain your answer.
2. In a 2011 study from Texas A & M University, forty-two drivers were placed behind the wheel of a car and drove around a closed track about 11 miles in length. The researchers monitored how long it took drivers to react to a flashing light while driving normally and while attempting to text or to read a message on a mobile phone. Here is a summary of the data.

conditions	# observations	standard	
		mean	deviation
control	42	1.754	0.806
texting	42	4.302	1.614
reading	42	3.278	1.274

- (a) Give the appropriate hypothesis for this situation.
- (b) Determine the value of the F statistic for a one way analysis of variance.
- (c) What are the degrees of freedom appropriate with this test.

- (d) Give the p -value for the test. What are your conclusions?
- (e) Give a 95% confidence interval for the difference in mean reaction times between texting and control and between reading and control.
- (f) Give a hypothesis for the contrast that compares the control to the average of the mean times for texting and writing.
- (g) Give the value of the t -statistic for this test. What are the degrees of freedom?
- (h) Do you reject this hypothesis? Explain your answer.