

Math 425 - Homework 6

Due Wednesday 05/01

These problems were taken from various versions of the text, so the numbers likely will not correspond to anything. Unless otherwise instructed, conduct all hypothesis tests at the $\alpha = .05$ level.

1. *Problem 18.12:* Motorola is doing some product testing to determine which style of phone college students prefer. While at IIT they talked to $n = 120$ students with the following results

Design 1	Design 2	Design 3	Design 4
20	33	45	22

Does this data indicate any specific preference?

2. *Problem 18.21:* 120 gymnasts were polled to determine whether having a pet during childhood caused the development of allergies later in life. The results are in the table below.

	Number of pets		
	0	1	2 or more
No Allergies	22	50	18
Allergies	18	10	2

Does this data indicate independence between a gymnast's pet population and their allergy status?

3. *Problem 19.1:* To investigate the effect of "home team advantage", I watched 64 football games this NFL season. Of these $n = 64$ games, $x = 42$ were won by the home team. Does this result provide enough evidence to conclude that home teams win significantly more games than would be expected by chance?
4. I am also interested in the effect of "home court advantage" for teams in the NBA playoffs, which have recently started. My specific interest lies in whether the proportion of wins is higher for home teams in the Western Conference and in the Eastern Conference. The results were

Western Conference	Eastern Conference
$n_1 = 37$	$n_2 = 42$
$X_1 = 24$	$X_2 = 29$

where n is the number of games played, and X is the number of wins by the home team. Determine if the proportion of wins by the home team in the Western Conference p_1 is different than the proportion of wins by the home team in the Eastern Conference p_2 .

This question can either be addressed with a χ^2 test, or with the content on the *notes* sections on the class website under "proportions".

5. This question requires SPSS. Download the Employee Data file from the class website; this file refers to the employees of the Iron Mike corporation.

Recall that instructions for conducting the required statistical analysis is available on the class website. Also recall that the “Variable View” tab will help explain what certain columns of data mean.

Note that some of the nonparametric tests (χ^2 Goodness of Fit and Binomial) may be found in the “Legacy Dialogs” tab under the nonparametric tab. The tutorials may not reflect this, as when I made the tutorials the version of SPSS did not have this layout.

- (a) Run a χ^2 -test of independence to determine if the distribution of employees in job categories is independent of a person’s gender.
- (b) The US currently has a racial minority population of 36.6%. Run a binomial test on the employees of the Iron Mike corporation to see if they are statistically different than that proportion.
- (c) Consider the following variables:
 - Current Salary
 - Beginning Salary
 - Years at Iron Mike corporation
 - Previous Experience

Before using SPSS, hypothesize about what significant correlations may exist between these variables. Now compute the actual correlations and determine which results are as you predicted, and which surprised you.

- (d) Fit a regression line to determine current salary as a function of age. Write down the resulting line in the form $Y = a + bX$ where X is the age and Y is the salary. Explain if this line fits the data well, based on the results of the hypothesis test.