

STAT 518 – HW 6 – Fall 2017

1) A die was rolled 600 times with the following results. Use the Chi-square Goodness of Fit Test to test whether the die is balanced. Use a significance level of 0.05. Give the null and alternative hypotheses, test statistic value, decision rule, and p-value.

Occurrence	1	2	3	4	5	6
Frequency	87	96	108	89	122	98

2) [Required for graduate students, extra credit for undergrads] A random sample of 26 observations was obtained. The question of interest is whether the data followed a normal distribution with mean 12 and standard deviation 3. None of the observations were below the lower quartile (25th percentile) of this distribution, and 12 were above the upper quartile. Six were below the median and 8 were between the median and the upper quartile. Use the Chi-square Goodness of Fit Test to test whether the data may come from this distribution. Use a significance level of 0.05. Give the null and alternative hypotheses, test statistic value, decision rule, and p-value.

3) 60 students were divided at random into two classes of 30 students each and taught to write a computer program. One class used a conventional method of teaching and the other class used an experimental method. At the end of the course, each student attempted to write the program, and was either successful or not. Here were the results:

	Successful	Unsuccessful
Conventional Class	23	7
Experimental Class	27	3

Test whether the experimental method tends to produce a higher chance of success than the conventional method. Use a significance level of 0.05. Give the null and alternative hypotheses, test statistic value, decision rule, and p-value.

4) A university received faculty applications from 21 males last year and hired 10. Also last year, it received applications from 63 female applicants and hired 14. Use Fisher’s exact test to test whether the university has a higher probability of hiring male applicants than female applicants. Use a significance level of 0.05. Give the null and alternative hypotheses and p-value.

5) Horses were selected at random from a sample of races, with a total sample size of 80 horses. These horses were classified according to both their post position (whether they started near the rail, or outside) and their finishing position (categorized as first, second, third, or other). Here are the data:

	First	Second	Third	Other
Near Rail	8	6	8	16
Outside	3	6	5	28

Is the horses’ finishing position dependent on their post position? Use a chi-square test and use $\alpha = 0.05$. Which specific test are you using here?

6) One hundred army recruits were randomly assigned to four drill sergeants in boot camp. At the end of the camp, 84 recruits remained, and their performances in an obstacle course was measured. For Sgt. Anson, 11 of his 20 recruits performed above the median. For Sgt. Baker, 8 of her 22 recruits performed above the median. For Sgt. Connor, 8 of his 20 performed above the median. The remaining finishing recruits were under Sgt. Davis, and of these, 15 performed above the median. Is there a significant difference in the performance results for the four drill sergeants? Use the median test and use $\alpha = 0.05$. Give the null and alternative hypotheses, test statistic value, and decision rule.