

STAT 518 – HW 2 – Fall 2017

- 1) A coin is tossed 6 times. A blindfolded subject guesses each time whether the coin is a “head”. The null hypothesis is that the probability p that the subject guesses correctly is 0.5. The alternative is that $p > 0.5$. The test statistic is the number of times the subject guesses correctly. We will reject H_0 if all 6 of the guesses are correct.
 - (a) For this hypothesis test, describe the power function.
 - (b) Give a graph of the power function.
 - (c) Is this test unbiased?

- 2) We will test $H_0: p = 0.5$ vs. $H_1: p \neq 0.5$ using two tests, both at the same level of significance. The first test, T_1 , requires a sample of size 40 when T_2 needs a sample of size 100 for their power functions to be equal at the particular alternative $p = 0.25$. What is the efficiency of T_2 relative to T_1 ?

- 3) A regulatory agency suspected that more than 10% of all cars of a certain automobile model are unsafe. A random sample of 16 cars finds that 6 of these sampled cars are unsafe.
 - (a) Test the appropriate hypotheses, keeping the significance level at no more than 0.05. Give your decision rule, test statistic value, p-value, and conclusion.
 - (b) What is a 90% confidence interval for the true proportion of unsafe cars in the population?

- 4) The overall proportion passing of all people taking the Texas bar exam is known to be 0.70. This year, 20 Texas Tech law school graduates took the bar exam and of these, 18 passed. Do we have sufficient evidence to conclude that the probability of a Texas Tech law school graduate passing the bar exam is higher than the overall rate? Test the appropriate hypotheses, keeping the significance level at no more than 0.05. Give your decision rule, test statistic value, p-value, and conclusion.

- 5) A random sample of tenth-grade boys resulted in the following 16 observed weights:
144,135,96,124,133,108,156,138,99,136,85,121,165,147,155,162.
 - (a) Test whether the upper quartile (75th percentile) of 10th-grade male weights is greater than 150. Keep the significance level at no more than 0.05. Give your decision rule, test statistic value, p-value, and conclusion.
 - (b) Find an approximate 90% confidence interval for the population median 10th-grade male weight.

- 6) [Required for graduate students, extra credit for undergraduates] Suppose the A.R.E. of test T_1 relative to test T_2 is 0.3 and the A.R.E. of test T_3 relative to T_2 is 0.6. What is the A.R.E. of test T_1 relative to T_3 ?