

Stat 2630: Homework 10

1. Let p be the probability of success in a sequence of n Bernoulli trials. Consider testing

$$H_0 : p = 1/2 \text{ versus } H_1 : p = 1/4$$

and rejecting the null if $n = 20$ trials results in 5 or fewer successes.

- (a) What is the size of the test?
 - (b) What is the power of the test?
2. Suppose that lifetime of a tire (in miles), say X , is normally distributed with mean θ and standard deviation $\sigma = 5000$. Past experience indicates that $\theta = 30000$ miles, but the manufacturer claims that a new production process has increased the mean lifetime. Given n independent observed values x_1, x_2, \dots, x_n , we want to test

$$H_0 : \theta = 30000 \text{ versus } H_1 : \theta > 30000$$

using a rejection rule of the form $\bar{x} \geq c$.

- (a) Write down the formula for the benchmark c so that the test has size $\alpha = .02$.
- (b) Calculate the values of n and c so that the test has size $\alpha = .02$ and power $\gamma(35000) = .90$.