

STAT 495, Fall 2008

Homework Assignment #9

1. A company uses a hydraulic transmission in one of its products. The company wants the transmission to pass a series of tests on a test stand before they will use the transmission in their product. Time is short and they can only test 10 transmissions selected at random from the incoming shipment of 50. For this probability exercise assume that 5 of the transmissions in the shipment are defective and will not pass the tests.
 - a. If the 10 transmissions to be tested are sampled without replacement (a reasonable approach), what is the probability that all of the 10 pass the tests? One of the ten fails? 5 of the 10 fail?
 - b. If the 10 transmissions to be tested are sampled with replacement (not a reasonable approach but one that leads to easier probability calculations), what is the probability that all of the 10 pass the tests? One of the ten fails? 5 of the 10 fail?
 - c. How do the probabilities in a) and b) compare?

2. A supplier ships parts in lots of 1000. Your acceptance sampling scheme is to accept the lot if there are 0 or 1 defective parts in a random sample of 10, sampling with replacement.
 - a. If there are 25 defective parts in a lot, what is the chance that the lot is accepted?
 - b. Below is a table giving various different values for the number of defective parts and the corresponding probability of accepting such a lot based on the scheme described above. According to the table what is 91.4% upper bound on the number of defective parts in a lot?

number of defective parts in lot	50	100	150	200	250	300	350	400
probability of accepting lot	0.914	0.736	0.544	0.376	0.244	0.149	0.086	0.046

3. You receive a shipment of 100,000 microchips that are programmed for keyless entry systems for vehicles. Some of the microchips may be defective and you do not want to accept the shipment unless you are sure that there is only a small proportion of defective chips. You select 1000 microchips at random and discover that 11 are defective.
 - a. Construct a 95% confidence interval on the true proportion of defective microchips in the shipment given sampling was done without replacement.
 - b. Construct a 95% confidence interval on the true proportion of defective microchips in the shipment given sampling was done with replacement.
 - c. How do the two confidence intervals compare?