

3. A manufacturing plant receives a shipment of 10 hard drives to manufacture laptop PC's. It is known that the defect rate is 2.5%.

(a) Calculate the probability that all 10 hard drives will function properly. (5 pts)

(b) Calculate the probability that all but one will function properly. (3 pts)

(c) Calculate the probability that two or more will not function properly. (2 pts)

4. Let X be the number of accidents on Garden State Parkway on a single day. Assume that X follows a Poisson distribution with a mean of 3.

(a) What is the probability that there are no accidents in the whole day? (4 pts)

(b) What is the probability that there are no accidents on two consecutive days? (3 pts)

(c) What is the probability that there are at least 2 accidents on a single day? (3 pts)

5. The life span of a component is exponentially distributed with a mean of 10 hours.

(a) What is the probability that the component will last at most 10 hours? (4 pts)

(b) At least 10 hours? (2 pts)

(c) What is the median time? (4 pts)

(d) Given that component has lasted 10 hours what is the probability that it will last a total of 20 hours? (2 pts)

6. An anthropologist measured the height (in inches) of a random sample of twenty-five men in a certain tribe, and she found that the sample mean was 72.4 and the sample standard deviation was 2.2. Determine the 95% confidence interval of the average height of all men in the tribe. You can assume that height is normally distributed. (10 pts)

7. For a project, a student asks a random sample of ten fellow students to keep track of how much they spend on laundry in a month. Here are data, in dollars:

17	13.5	20.5	24	24.75
27.25	9.5	18.25	24.5	14.5

The sum of these data is 193.75, and the sum of their squares is 4056.44.

- (a) Determine a 90% confidence interval for the variance of the monthly laundry expenses. (8 pts)

- (b) At the 5% significance level, test the (null) hypothesis that, on average, students spend at most \$16 a month on laundry. (8 pts)

8. Let X_1, \dots, X_n be a simple random sample of size n from a population with mean μ and standard deviation σ . Let $Y = X_1 + X_2 + \dots + X_n$. Calculate the mean and standard deviation of Y . (10 pts)

9. The battery charge of laptops from two companies is compared. The result is that a simple random sample of 50 laptops from one company lasts, on the average, 2.56 hours with a sample standard deviation of 0.4 hours. While a simple random sample of 60 laptops from the other company lasts on the average 2.65 hours with a sample standard deviation of 0.3 hours.

- (a) Calculate a 90% confidence interval for the difference between the means. (6 pts)

- (b) At the 10% significance level test the null hypotheses that the two means are equal against the alternative that they are different. (6 pts)