

c. What is the probability that the sample mean differs from the population mean $\mu = 7.8$ by no more than 0.5?

Question 2 (9 points) Suppose a sample of 120 items is drawn from a population of manufactured products and the number of defective items is recorded. Prior experience has shown that the proportion of defectives is 0.05.

- a. Completely describe the sampling distribution of p , the proportion of defectives.
- b. What is the probability that the sample proportion is within 0.02 of p ?
- c. How would the sampling distribution of the sample proportion change if the sample size were raised to 200?

Question 3 (7 points) A proportion of a college basketball team's season ticket holders renew their tickets for the next season. Let p denote the true proportion of ticket holders who buy tickets again for the following season. A random sample of 125 ticket holders revealed 90 people plan on renewing their tickets.

a. Give a point estimate for p .

b. Calculate the approximate standard error for the statistic used in part (a) above.

c. What is the 99% margin of error for this point estimate?

Question 4: (8 points) a. Calculate the width of a 99% confidence interval for μ using $\sigma = 20$ and $n = 302$.

b. Calculate the 90% confidence interval for the population mean μ with $\bar{x} = 320$, $\sigma = 20$ and $n = 302$, and **interpret the result**.

Question 5: (8 points) A parent believes the average height for 14 year old girls differs from that of 14 year old boys. Estimate the difference in the height between girls and boys using a 95% confidence interval. The summary data are listed below where height is in feet.

$n_1 = 40$, $\bar{x}_1 = 5.1$, $s_1 = 0.2$, $n_2 = 42$, $\bar{x}_2 = 4.8$, and $s_2 = 0.3$.

Based on your interval, do you think there is a significant difference between the true mean height of 14 year old girls and boys? Explain.

Question 6 (10 points) A stylist at The Hair Care Palace gathered data on the number of hair colorings given on Saturdays and on weekdays. Her results are listed below. Assume the two samples were independently taken from normal populations.

Saturday: $n_1 = 50$ and $\bar{x}_1 = 14$

Weekday: $n_2 = 65$ and $\bar{x}_2 = 13$

i) Find the point estimate of $p_1 - p_2$ and the 99% margin of error.

ii) Estimate the difference in the true proportions with a 99% confidence interval. **Interpret this interval.**

Question 7 (8 points) A new light bulb is being considered for use in an office with computers. It is decided that the new bulb will only be used if it has a mean lifetime of more than 500 hours. A random sample of 40 bulbs is selected and placed on life test. The mean and standard deviation are found to be 505 hours and 18 hours, respectively.

a. State the null and alternative hypotheses

b. Perform the appropriate test of hypothesis to determine whether the new bulb should be used. Use a 0.01 level of significance (that is, $\alpha = 0.01$).

c. What is the critical value?

d. Interpret the result (that is, write the conclusion)

Best of luck!