Confidence Intervals and Hypothesis Testing Pen and Paper Questions

Formulae and tables

1. A company is selling shampoo and one of their offerings is a 200 ml bottle. If the mean amount calculated for a sample of 100 bottles is 200 ml and the standard deviation 2 ml, what is the range within which the mean amount of shampoo in a bottle is expected to be found with a confidence of 95%?

2. The company from question 1 has measured the shampoo amounts in 100 bottles and found that the mean value is 197 ml. Test the null hypothesis that the mean amount poured by the machine is 200 ml, with a significance level of $\alpha = 1\%$.

3. The distribution of ages of people attending a concert is normal. A random sample of 3 is taken and it consists of the following values: 19, 20, 24. State the confidence interval for the mean age calculated on the given sample, with 97.5% confidence.

4. The distribution of ages of people attending a concert can be considered to be normal. A random sample is taken and it consists of the following values: 19, 20, 21, 21, 24. Perform a hypothesis test to check if the average age of the concert-goers is 22 or older, with 0.025 significance.