

Written Homework #3
ChE 231
Spring 2019

Problem 1. Consider a continuous reactor for producing a polymer product. The following data was obtained for the scaled polymer polydispersity of eight separate runs: $x = \{1.21 \ 0.89 \ 1.06 \ 1.12 \ 0.92 \ 1.18 \ 0.98 \ 0.82\}$.

1. Compute the mean and variance from these samples. Compute the 99% confidence intervals on the mean and variance.
2. Test the hypothesis that the mean $\mu = \mu_0 = 1$ versus the alternative that $\mu = \mu_1 < \mu_0$ at a significance level $\alpha = 0.05$.
3. Test the hypothesis that the variance $\sigma^2 = \sigma_0^2 = 0.015$ versus the alternative that $\sigma^2 = \sigma_1^2 > \sigma_0^2$ at a significance level $\alpha = 0.05$.

Problem 2. Consider a system for manufacturing spherical nanoparticles. The following diameter measurements were obtained for 5 nanoparticles: $x = \{0.12 \ 0.09 \ 0.11 \ 0.10 \ 0.08\}$

1. Compute the mean and variance from these samples. Compute the 90% confidence intervals on the mean and variance.
2. (5 pts) Test the hypothesis that the mean $\mu = \mu_0 = 0.10$ versus the alternative that $\mu < \mu_0$ at a significance level $\alpha = 0.05$. Determine the smallest value $\mu_0 > 0.10$ such that the hypothesis would be rejected.