

STAT 5309

HW 1

Due: Thurs, Jan 31

1.

- 2-13. A new filtering device is installed in a chemical unit. Before its installation, a random sample yielded the following information about the percentage of impurity: $\bar{y}_1 = 12.5$, $S_1^2 = 101.17$, and $n_1 = 8$. After installation, a random sample yielded $\bar{y}_2 = 10.2$, $S_2^2 = 94.73$, $n_2 = 9$.
- (a) Can you conclude that the two variances are equal? Use $\alpha = 0.05$.
 - (b) Has the filtering device reduced the percentage of impurity significantly? Use $\alpha = 0.05$.

2.

- 2-14. Twenty observations on etch uniformity on silicon wafers are taken during a qualification experiment for a plasma etcher. The data are as follows:

5.34	6.65	4.76	5.98	7.25
6.00	7.55	5.54	5.62	6.21
5.97	7.35	5.44	4.39	4.98
5.25	6.35	4.61	6.00	5.32

- (a) Construct a 95 percent confidence interval estimate of σ^2 .
- (b) Test the hypothesis that $\sigma^2 = 1.0$. Use $\alpha = 0.05$. What are your conclusions?
- (c) Discuss the normality assumption and its role in this problem.
- (d) Check normality by constructing a normal probability plot. What are your conclusions?

3.

- 2-15. The diameter of a ball bearing was measured by 12 inspectors, each using two different kinds of calipers. The results were

Inspector	Caliper 1	Caliper 2
1	0.265	0.264
2	0.265	0.265
3	0.266	0.264
4	0.267	0.266
5	0.267	0.267
6	0.265	0.268
7	0.267	0.264
8	0.267	0.265
9	0.265	0.265
10	0.268	0.267
11	0.268	0.268
12	0.265	0.269

- (a) Is there a significant difference between the means of the population of measurements from which the two samples were selected? Use $\alpha = 0.05$.
- (b) Find the P -value for the test in part (a).
- (c) Construct a 95 percent confidence interval on the difference in mean diameter measurements for the two types of calipers.