8.72 Organic chemists often purify organic compounds by a method known as fractional crystallization. An experimenter wanted to prepare and purify 4.85 g of aniline. Ten 4.85-g specimens of aniline were prepared and purified to produce acetanilide. The following dry yields were obtained:

3.85, 3.88, 3.90, 3.62, 3.72, 3.80, 3.85, 3.36, 4.01, 3.82.

Construct a 95% confidence interval for the mean number of grams of acetanilide that can be recovered from 4.85 g of aniline.

8.78 Solid copper produced by sintering (heating without melting) a powder under specified environmental conditions is then measured for porosity (the volume fraction due to voids) in a laboratory. A sample of $n_1 = 4$ independent porosity measurements have mean $\bar{y}_1 = .22$ and variance $s_1^2 = .0010$. A second laboratory repeats the same process on solid copper formed from an identical powder and gets $n_2 = 5$ independent porosity measurements with $\bar{y}_2 = 0.17$ and $s_2^2 = 0.0020$. Estimate the true difference between the population means $(\mu_1 - \mu_2)$ for these two laboratories, with confidence coefficient 0.95.

8.82 In Exercise 8.69 we gave the carapace lengths of ten mature *Thenus orientalis* lobsters caught in the seas in the vicinity of Singapore. For your convenience, the data are reproduced here. Suppose that you wished to describe the variability of the carapace lengths of this population of lobsters. Find a 90% confidence interval for the population variance σ^2.

Lobster field number	*A061*	*A062*	*A066*	*A070*	*A067*	*A069*	*A064*	*A068*	*A065*	*A063*
Carapace length (mm)	78	66	65	63	60	60	58	56	52	50

8.86 Industrial lightbulbs should have a mean life length acceptable to potential users and a relatively small variation in life length. If some bulbs fail too early in their life, users become annoyed and are likely to switch to bulbs produced by a different manufacturer. Large variations above the mean reduce replacement sales; and in general, variation in life lengths disrupts the user's replacement schedules. A random sample of 20 bulbs produced by a particular manufacturer produced the following lengths of life (in hours):

2100	2302	1951	2067	2415	1883	2101	2146	2278	2019
1924	2183	2077	2392	2286	2501	1946	2161	2253	1827

Set up a 99% upper confidence bound for the *standard deviation* of the lengths of life for the bulbs produced by this manufacturer. Is the true population standard deviation less than 150 hours? Why or why not?