Exercise Set #26
Answers to Odd-Numbered Exercises

26-1 (a) \( \bar{p} = 136/1000 = 0.136 \) Using \( z_{0.05} = 1.645 \), the limits of the 90% confidence interval are \( 0.118 < \lambda < 0.154 \).

We are 90% confident that the proportion of color blind drivers in the state is between 0.118 and 0.154.

(b) Since 0.15 is inside the 90% confidence interval, the null hypothesis \( H_0: \lambda = 0.15 \) would most likely not be rejected with \( \alpha = 0.10 \).

(c) Since 0.11 is outside the 90% confidence interval, the null hypothesis \( H_0: \lambda = 0.11 \) would most likely be rejected with \( \alpha = 0.10 \).

(d) A 95% or 99% confidence interval would have longer length than the 90% confidence interval.

(e) A 90% confidence interval based on a simple random sample of 500 licensed drivers would tend to have longer length than the 90% confidence interval based on a simple random sample of 1000 licensed drivers.

26-3 (a) \( \bar{p}_N = 54/450 = 0.12 \) \( \bar{p}_S = 50/625 = 0.08 \) Using \( z_{0.025} = 1.960 \), the limits of the 95% confidence interval are \( 0.0032 < \lambda_N - \lambda_S < 0.0768 \).

We are 95% confident that the difference in proportion of overweight packages between the two plants is between 0.0032 and 0.0768, with a higher proportion in the northern factory than in the southern factory.
26-3 - *continued*

(b) Since 0 (zero) is outside the 95% confidence interval, the null hypothesis, the null hypothesis $H_0: \lambda_N - \lambda_S = 0$ would most likely be rejected with $\alpha = 0.05$.

(c) A 90% confidence interval would have shorter length than the 95% confidence interval.

(d) A 99% confidence interval would have longer length than the 95% confidence interval.

(e) A 95% confidence interval based on two simple random samples each of size 200 packages would tend to have longer length than the 95% confidence interval based on simple random samples of size 450 and 625 packages.

26-5 (a) $n_a = 4$, $\bar{x}_a = 590$ hours, $s_a = 19.4422$ hours,

$n_b = 3$, $\bar{x}_b = 555$ hours, $s_b = 23.3880$ hours.

For the 99% confidence interval based on the separate $t$ test, we find that $df = 4$ and the limits are $-42.82 < \mu_a - \mu_b < 112.82$. The interpretation of the confidence interval is as follows:

We are 99% confident that the difference in mean lifetime between the Sunn and Brighto brand light bulbs is between $-42.82$ and $112.82$ hours, which suggests that there is no difference in mean lifetime.

(b) Since 0 (zero) is inside the 99% confidence interval, the null hypothesis $H_0: \mu_a - \mu_b = 0$ would most likely not be rejected with $\alpha = 0.01$. 
26-5 - continued

(c) A 90% or 95% confidence interval would have shorter length than the 99% confidence interval.

(d) A 99% confidence interval based on two simple random samples each of size 20 bulbs would tend to have shorter length than the 95% confidence interval based on two simple random samples of size 3 and 4 bulbs.

26-7 (a) \( n = 20, \ \bar{x} = 25.8 \) milligrams, \( s = 1.83 \) milligrams. Using \( t_{19,0.005} = 2.861 \), the limits of the 99% confidence interval are \( 24.63 < \mu < 26.97 \).

We are 99% confident that the mean nicotine content per Econo cigarette is between 24.63 and 26.97 milligrams.

(b) Since 25 is inside the 99% confidence interval, the null hypothesis \( H_0: \mu = 25 \) would most likely not be rejected with \( \alpha = 0.01 \).

(c) A 90% or 95% confidence interval would have shorter length than the 99% confidence interval.

(d) A 99% confidence interval based on a simple random sample of size 10 Econo cigarettes would tend to have longer length than the 99% confidence interval based on a simple random sample of 20 Econo cigarettes.