

### Text Exercise Set 26

**26-1** A state government official is interested in the prevalence of color blindness among drivers in the state. In a simple random sample of 1000 licensed drivers, 136 were found to be color blind.

- (a) Find and interpret a 90% confidence interval for the proportion of color blind drivers in the state.
  
  
  
  
  
  
  
  
  
  
- (b) If a hypothesis test with  $\alpha = 0.10$  were to have been performed to see if there were any evidence that the proportion of color blind drivers is different from 0.15, what would most likely be concluded?
  
  
  
  
  
  
  
  
  
  
- (c) If a hypothesis test with  $\alpha = 0.10$  were to have been performed to see if there were any evidence that the proportion of color blind drivers is different from 0.11, what would most likely be concluded?
  
  
  
  
  
  
  
  
  
  
- (d) How would a 95% or 99% confidence interval be different from the one found in part (a)?
  
  
  
  
  
  
  
  
  
  
- (e) How would the confidence interval in part (a) most likely have been different, if it had been based on a simple random sample of 500 licensed drivers?

**26-2** A forest ranger examines a simple random sample of 300 trees in a wooded area and finds that 51 have been affected by a recent blight.

- (a) Find and interpret a 95% confidence interval for the proportion of trees in the wooded area affected by the recent blight.
  
  
  
  
  
  
  
  
  
  
- (b) How would a 90% confidence interval be different from the one found in part (a)?

**26-2** - *continued*

- (c) How would a 99% confidence interval be different from the one found in part (a)?
  
- (d) How would the confidence interval in part (a) most likely have been different, if it had been based on a simple random sample of 800 trees?

**26-3** The proportion of overweight packages is being compared for two plants, one in the northern section of the city and one in the southern section of the city. In a simple random sample of 450 packages from the northern plant, 54 were overweight; in a simple random sample of 625 packages from the southern plant, 50 were overweight.

- (a) Find and interpret a 95% confidence interval for the difference in proportion of overweight packages between the two plants.
  
  
  
  
  
  
  
  
  
  
- (b) If a hypothesis test with  $\alpha = 0.05$  were to have been performed to see if there were any evidence of a difference in the proportion of overweight packages between the two plants, what would most likely be concluded?
  
  
  
  
  
  
  
  
  
  
- (c) How would a 90% confidence interval be different from the one found in part (a)?
  
  
  
  
  
  
  
  
  
  
- (d) How would a 99% confidence interval be different from the one found in part (a)?
  
  
  
  
  
  
  
  
  
  
- (e) How would the confidence interval in part (a) most likely have been different, if it had been based on two simple random samples each of size 200 packages?

**26-4** The number of hours that male voters in a certain state listen to the radio weekly is being studied. The 15 males selected for the SURVEY DATA, displayed as Data Set 1-1 at the end of Unit 1, are treated as a simple random sample. The data is as follows:

15 20 15 18 30 10 11 12 20 4 14 15 23 15 24

- (a) Find and interpret a 90% confidence interval for mean time male voters in the state listen to the radio weekly.
  
  
  
  
  
  
  
  
  
  
- (b) If a hypothesis test with  $\alpha = 0.10$  were to have been performed to see if there were any evidence that the mean time male voters in the state listen to the radio weekly is different from 18 hours, what would most likely be concluded?
  
  
  
  
  
  
  
  
  
  
- (c) If a hypothesis test with  $\alpha = 0.10$  were to have been performed to see if there were any evidence that the mean time male voters in the state listen to the radio weekly is different from 12 hours, what would most likely be concluded?
  
  
  
  
  
  
  
  
  
  
- (d) How would a 95% or 99% confidence interval be different from the one found in part (a)?
  
  
  
  
  
  
  
  
  
  
- (e) How would the confidence interval in part (a) most likely have been different, if it had been based on a simple random sample of 90 male voters?

**26-5** The following data consists of light bulb lifetimes recorded in hours for a simple random sample of Sunn brand bulbs and a simple random sample of Brighto brand bulbs:

Sunn 575 611 572 602

Brighto 568 569 528

- (a) Find and interpret a 99% confidence interval for the difference in mean lifetime between the Sunn and Brighto brand light bulbs; use the confidence interval based on the separate  $t$  statistic.
- (b) If a hypothesis test with  $\alpha = 0.01$  were to have been performed to see if there were any evidence of a difference in mean lifetime, what would most likely be concluded?
- (c) How would a 90% or 95% confidence interval be different from the one found in part (a)?
- (d) How would the confidence interval in part (a) most likely have been different, if it had been based on two simple random samples each of size 20 bulbs?

**26-6** Two brands of firecrackers, BigBoom and LightBlast, are being compared, and the difference in the proportion of duds is of interest. In a random sample of 720 BigBoom firecrackers, 135 were duds; in a random sample of 550 LightBlast firecrackers, 143 were duds.

(a) Find and interpret a 95% confidence interval for the difference in proportion of duds between BigBoom and LightBlast firecrackers.

(b) If a hypothesis test with  $\alpha = 0.05$  were to have been performed to see if there were any evidence of a difference in the proportion of duds between the two brands, what would most likely be concluded?

(c) How would a 90% confidence interval be different from the one found in part (a)?

(d) How would a 99% confidence interval be different from the one found in part (a)?

(e) How would the confidence interval in part (a) most likely have been different, if it had been based on two simple random samples each of size 300 firecrackers?

**26-7** The mean nicotine content per cigarette for Econo cigarettes is of interest. In a random sample of 20 cigarettes, the mean nicotine content per cigarette is found to be 25.80 milligrams, and the standard deviation is found to be 1.83 milligrams.

(a) Find and interpret a 99% confidence interval for the mean nicotine content per Econo cigarette.

(b) If a hypothesis test with  $\alpha = 0.01$  were to have been performed to see if there were any evidence that the mean nicotine content was different from 25 milligrams, what would most likely be concluded?

(c) How would a 90% or 95% confidence interval be different from the one found in part (a)?

(d) How would the confidence interval in part (a) most likely have been different, if it had been based on a simple random sample of size 10 Econo cigarettes?

**26-8** The difference in yearly income between male and female voters in a certain is being studied. The 15 males and 15 females selected for the SURVEY DATA, displayed as Data Set 1-1 at the end of Unit 1, are treated as two independent random samples. These yearly incomes (\$1000s) are as follows:

Male 34 35 55 75 30 53 78 68 39 60 65 61 45 64 39

Female 28 71 26 27 45 34 30 29 40 49 39 33 25 41 44

(a) Find and interpret a 99% confidence interval for the difference in mean yearly income between the male and female voters; use the confidence interval based on the separate  $t$  statistic.

**26-8** - *continued*

- (b) If a hypothesis test with  $\alpha = 0.01$  were to have been performed to see if there were any evidence difference in mean yearly income between the male and female voters, what would most likely be concluded?
  
- (c) How would a 90% or 95% confidence interval be different from the one found in part (a)?
  
- (d) How would the confidence interval in part (a) most likely have been different, if it had been based on two simple random samples each of size 20 voters?

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