

5. A serum cholesterol level above 250 milligrams per deciliter (mg/dl) of blood is a risk factor for cardiovascular disease in humans. At a medical center in St. Louis, a study to test the effectiveness of a new cholesterol-lowering drug was conducted. One hundred people with cholesterol levels between 250 mg/dl and 300 mg/dl were available for this study. Fifty people were assigned at random to each of two treatment groups. One group received the standard cholesterol-lowering medication and the other group received the new drug. After taking the drug for three weeks, the 50 subjects who received the standard treatment had a mean decrease in cholesterol level of 10 mg/dl with a standard deviation of 8 mg/dl, and the 50 subjects who received the new drug had a mean decrease of 18 mg/dl with a standard deviation of 12 mg/dl. 2007(B)

Does the new drug appear to be more effective than the standard treatment in lowering mean cholesterol level? Give appropriate statistical evidence to support your conclusion.

2. A large company has two shifts—a day shift and a night shift. Parts produced by the two shifts must meet the same specifications. The manager of the company believes that there is a difference in the proportions of parts produced within specifications by the two shifts. To investigate this belief, random samples of parts that were produced on each of these shifts were selected. For the day shift, 188 of its 200 selected parts met specifications. For the night shift, 180 of its 200 selected parts met specifications. 2006(B)
- (a) Use a 96 percent confidence interval to estimate the difference in the proportions of parts produced within specifications by the two shifts.
- (b) Based only on this confidence interval, do you think that the difference in the proportions of parts produced within specifications by the two shifts is significantly different from 0? Justify your answer.

2. Anthropologists have discovered a prehistoric cave dwelling that contains a large number of adult human footprints. To study the size of the adults who used the cave dwelling, they randomly selected 20 of the footprints from the population of all footprints in the cave and measured the length of those footprints. Some statistics resulting from this random sample are as follows.

2000	Sample size	20	Minimum	15.2 cm
	Mean	24.8 cm	First quartile	18.7 cm
	Standard deviation	7.5 cm	Median	21.5 cm
			Third quartile	30.0 cm
			Maximum	37.0 cm

The anthropologists would like to construct a 95 percent confidence interval for the mean foot length of the adults who used the cave dwelling.

- (a) What assumptions are necessary in order for this confidence interval to be appropriate?
- (b) Discuss whether each of the assumptions listed in your response to (a) appears to be satisfied in this situation.

5. A rural county hospital offers several health services. The hospital administrators conducted a poll to determine whether the residents' satisfaction with the available services depends on their gender. A random sample of 1,000 adult county residents was selected. The gender of each respondent was recorded and each was asked whether he or she was satisfied with the services offered by the hospital. The resulting data are shown in the table below.

2004		Male	Female	Total
	Satisfied	384	416	800
	Not Satisfied	80	120	200
	Total	464	536	1,000

- (a) Using a significance level of 0.05, conduct an appropriate test to determine if, for adult residents of this county, there is an association between gender and whether or not they were satisfied with services offered by the hospital.
- (b) Is $\frac{800}{1,000}$ a reasonable estimate for the proportion of all adult county residents who are satisfied with the services offered by this hospital? Explain why or why not.