

## 2012 AP<sup>®</sup> STATISTICS FREE-RESPONSE QUESTIONS

5. A recent report stated that less than 35 percent of the adult residents in a certain city will be able to pass a physical fitness test. Consequently, the city's Recreation Department is trying to convince the City Council to fund more physical fitness programs. The council is facing budget constraints and is skeptical of the report. The council will fund more physical fitness programs only if the Recreation Department can provide convincing evidence that the report is true.

The Recreation Department plans to collect data from a sample of 185 adult residents in the city. A test of significance will be conducted at a significance level of  $\alpha = 0.05$  for the following hypotheses.

$$H_0 : p = 0.35$$

$$H_a : p < 0.35,$$

where  $p$  is the proportion of adult residents in the city who are able to pass the physical fitness test.

- (a) Describe what a Type II error would be in the context of the study, and also describe a consequence of making this type of error.
- (b) The Recreation Department recruits 185 adult residents who volunteer to take the physical fitness test. The test is passed by 77 of the 185 volunteers, resulting in a  $p$ -value of 0.97 for the hypotheses stated above. If it was reasonable to conduct a test of significance for the hypotheses stated above using the data collected from the 185 volunteers, what would the  $p$ -value of 0.97 lead you to conclude?
- (c) Describe the primary flaw in the study described in part (b), and explain why it is a concern.