

The U.S. Department of Transportation defines an airline flight as being “on-time” if it landed less than 15 minutes after the scheduled time shown in the carrier’s Computerized Reservation System. Cancelled and diverted flights are counted as late. A study of the 10 largest U.S. domestic airlines found Southwest Airlines to have the lowest proportion of late arrivals, 0.1577 (Nikos Tsikriktsis and Janelle Heineke, “The Impact of Process Variation on Customer Dissatisfaction: Evidence from the U.S. Domestic Airline Industry,” *Decision Sciences*, Winter 2004, 35(1): 129-142). Suppose you were asked to perform a follow-up study for Southwest Airlines in order to update the estimated proportion of late arrivals. What sample size would you use in order to estimate the population proportion to within an error of

- $\pm 0.06$  with 95% confidence?
- $\pm 0.04$  with 95% confidence?
- $\pm 0.02$  with 95% confidence?

### Answer

The sample  $n$  is given by the formula

$$n = \left( \frac{Z_{\alpha/2}}{E} \right)^2 p \cdot (1 - p)$$

a). Given that  $p = 0.1577$ ,  $E = 0.06$ ,  $Z_{\alpha/2} = 1.96$

$$n = 141.7451$$

**Sample size required = 142**

b). Given that  $p = 0.1577$ ,  $E = 0.04$ ,  $Z_{\alpha/2} = 1.96$

$$n = 318.9265$$

**Sample size required = 319**

c). Given that  $p = 0.1577$ ,  $E = 0.02$ ,  $Z_{\alpha/2} = 1.96$

$$n = 1275.706$$

**Sample size required = 1276**