7.9 Refer to Example 7.2. The amount of fill dispensed by a bottling machine is normally distributed with $\sigma = 1$ ounce. If $n = 9$ bottles are randomly selected from the output of the machine, we found that the probability that the sample mean will be within .3 ounce of the true mean is .6318. Suppose that $\overline{Y}$ is to be computed using a sample of size n.

a If $n = 16$, what is $P(|\overline{Y} - \mu| \leq .3)$?

b Find $P(|\overline{Y} - \mu| \leq .3)$ when $\overline{Y}$ is to be computed using samples of sizes $n = 25$, $n = 36$, $n = 49$, and $n = 64$.

c What pattern do you observe among the values for $P(|\overline{Y} - \mu| \leq .3)$ that you observed for the various values of n?

d Do the results that you obtained in part (b) seem to be consistent with the result obtained in Example 7.3?

7.20 **a** If U has a χ^2 distribution with ν df, find $E(U)$ and $V(U)$.

b Using the results of Theorem 7.3, find $E(S^2)$ and $V(S^2)$ when $Y_1, Y_2, \ldots, Y_n$ is a random sample from a normal distribution with mean μ and variance σ^2.