Additional Problems

1. The length of useful life a fluorescent tube used for indoor gardening is normally distributed. The useful life has a mean of 600 hrs and a standard deviation of 40 hrs. Determine the probability that

   (a) a tube chosen at random will last between 620 and 680 hrs.

   (b) such a tube will last more than 740 hrs.

   (c) such a tube will last less than 475 hrs.

   (d) a tube chosen at random will last less than 480 hrs or more than 720 hrs.

2. The waiting time at a certain bank is approximately normally distributed with a mean of 3.7 min and a standard deviation of 1.4 min.

   (a) Find the probability that a randomly selected customer has to wait less than 2.0 min.

   (b) What is the waiting time T such that the probability that a customer waits longer than T is only 0.05?

   (c) Find the probability that a randomly selected customer has to wait more than 6.0 min.

   (d) If a random sample of 2 customers is selected, find the probability that the average waiting time is more than 6.0 min.

   (e) If a random sample of 4 customers is selected, find the probability that the average waiting time is more than 6.0 min.

   (f) If a random sample of 10 customers is selected, find the probability that the average waiting time is more than 6.0 min.

   (g) What is the waiting time T such that the probability that $\bar{X}$ - average waiting time of 10 customers - is greater than T is only 0.05?

   (h) A random sample of 10 customers yielded an average waiting time of 5 min., what is the probability for observing this outcome or more extreme than the 5 min? Is this a unlikely event?

3. According to the 1993 *World Factbook*, the 1993 total fertility rate (mean number of children born per woman) for Madagascar is 6.75. Suppose the standard deviation of the total fertility rate is 2.5. The mean number of children for a sample of 200 randomly selected women is one value of many that form the sampling distribution of sample means.

   (a) What is the shape of this sampling distribution?

   (b) What is the mean value for this sampling distribution?

   (c) What is the standard deviation of this sampling distribution?

4. According to an article in the January 1991 issue of *Health* magazine, root-canal therapy costs from \$200 to \$700. Suppose the mean cost for root-canal therapy is \$450 and the standard deviation is \$125.

   (a) If a sample of 50 dentists was selected across the country, find the probability that the mean cost per root-canal for the sample between \$425 and \$475.

(b) If a sample of 100 dentists was selected across the country, find the probability that the mean cost per root-canal for the sample between $425 and $475.

(c) If the probability that the mean cost per root-canal for the sample between $440 and $460 is .95, what sample size is needed to satisfy these conditions?

5. According to the USA Snapshot "Knowing drug addicts," 45% of Americans know somebody who became addicted to a drug other than alcohol. Assuming this to be true, what is the probability that

(a) exactly 3 of a random sample of 5 know someone who became addicted?

(b) exactly 7 of a random sample of 15 know someone who became addicted?

(c) at least 7 of a random sample of 15 know someone who became addicted?

(d) no more than 7 of a random sample of 15 know someone who became addicted?

(e) at least 1000 of a random sample of 2000 know someone who became addicted?

(f) the proportion of a random sample of 2000 know someone addicted to a drug exceeds 55%?