third columns of Table 6-3 constitute a probability distribution for the random variable representing sample means, so those two columns represent the sampling distribution of the sample mean. In Table 6-3, some of the sample mean values are repeated, so we combined equal sample mean values in Table 6-4.

Table 6-3 Sampling Distribution of Mean

Sample	Sample Mean $\bar{x}$	Probability
4, 4	4.0	1/9
4, 5	4.5	1/9
4, 9	6.5	1/9
5, 4	4.5	1/9
5, 5	5.0	1/9
5, 9	7.0	1/9
9, 4	6.5	1/9
9, 5	7.0	1/9
9, 9	9.0	1/9

↔

Table 6-4 Sampling Distribution of Mean (Condensed)

Sample Mean $\bar{x}$	Probability
4.0	1/9
4.5	2/9
5.0	1/9
6.5	2/9
7.0	2/9
9.0	1/9

Interpretation

Because Table 6-4 lists the possible values of the sample mean along with their corresponding probabilities, Table 6-4 is an example of a sampling distribution of a sample mean.

The value of the mean of the population {4, 5, 9} is $\mu = 6.0$. Using either Table 6-3 or 6-4, we could calculate the mean of the sample values; we get 6.0. Because the mean of the sample means (6.0) is equal to the mean of the population (6.0), we conclude that the values of the sample mean do *target* the value of the population mean. (The top of Table 6-2 also shows that the values of the sample mean have a measure of center equal to μ.) It's unfortunate that this sounds so much like doublespeak, but this illustrates that *the mean of the sample means is equal to the population mean* μ. Read that last sentence a few times until it makes sense.

If we were to create a probability histogram from Table 6-4, it would not have the bell shape that is characteristic of a normal distribution (as suggested by the top of Table 6-2), but that is because we are working with such small samples. If the population of {4, 5, 9} were much larger and if we were selecting samples much larger than $n = 2$ as in this example, we would get a probability histogram that is much closer to being bell-shaped, indicating a normal distribution, as in Example 2.

Example 2 Sampling Distribution of the Sample Mean

Consider repeating this process: Roll a die 5 times to randomly select 5 values from the population {1, 2, 3, 4, 5, 6}, then find the mean $\bar{x}$ of the results. What do we know about the behavior of all sample means that are generated as this process continues indefinitely?

Solution

The top portion of Table 6-5 illustrates a process of rolling a die 5 times and finding the mean of the results. Table 6-5 shows results from repeating this process 10,000 times, but the true sampling distribution of the mean involves repeating the process indefinitely. Because the values of 1, 2, 3, 4, 5, 6 are all equally likely, the population has a mean of $\mu = 3.5$, and Table 6-5 shows that the 10,000 sample