<table>
<thead>
<tr>
<th>Associated Random Variable</th>
<th>Population</th>
<th>One Simple Random Sample $y_1, y_2, \ldots, y_n$ of size $n$</th>
<th>All Simple Random Samples of size $n$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$Y$</td>
<td>$Y$</td>
<td>$\bar{Y}_n$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The population for $\bar{Y}_n$ is all simple random samples of size $n$ from $Y$. The value of $\bar{Y}_n$ for a particular simple random sample is the sample mean $\bar{y}$ for that sample.</td>
<td></td>
</tr>
<tr>
<td>Associated Distribution</td>
<td>$Y$ has a normal distribution.</td>
<td>The sample is from the (normal) distribution of $Y$.</td>
<td>The distribution of $\bar{Y}_n$ is called the <em>Sampling Distribution</em>. The theorem tells us that the sampling distribution is normal.</td>
</tr>
<tr>
<td>Associated Mean(s)</td>
<td>Population mean $\mu$, also called $E(Y)$, or the expected value of $Y$, or the expectation of $Y$</td>
<td>Sample mean $\bar{y} = (y_1 + y_2 + \ldots + y_n)/n$ It’s an estimate of $\mu$.</td>
<td>Since it’s a random variable, $\bar{Y}_n$ also has a mean, $E(\bar{Y}_n) = \mu$. (In other words, the random variables $Y$ and $\bar{Y}_n$ have the same mean – i.e., $E(\bar{Y}_n) = E(Y) = \mu$.)</td>
</tr>
<tr>
<td>Associated Standard Deviation</td>
<td>Population standard deviation $\sigma$</td>
<td>Sample standard deviation $s = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (x - \bar{x})^2}$ s is an estimate of the population standard deviation $\sigma$</td>
<td>Sampling distribution standard deviation. The theorem tells us that the standard deviation of the sampling standard deviation is $\sigma/\sqrt{n}$.</td>
</tr>
</tbody>
</table>