versus some unspecified alternative greater than 100. If the experimenter can reject the hypothesis that $\mu = 100$ at $\alpha = .05$ level of significance, then he can reject any other hypothesis that $\mu < 100$ at a level of significance $\leq .05$. The decision rule for this example can be stated as follows: If the test statistic falls among the highest 5 percent of z's in a normal distribution under H_0, reject H_0; otherwise do not reject H_0. If H_0 is rejected, the experimenter, in this example, decides in favor of H_1.

We have stated the null and alternative hypotheses, decided on an appropriate sample statistic and test statistic, and specified the level of significance that will be used in the decision process. The final steps in the hypothesis-testing procedure are to specify the size of the sample that will be observed, obtain the sample, compute the sample statistic and test statistic, and make a decision. Suppose that a random sample of $n = 100$ observations has been obtained from the population and that the mean of this sample is equal to $\bar{X} = 102$. Is the deviation of this sample mean from the predicted mean of 100 large enough to lead the experimenter to reject the null hypothesis? The probability associated with obtaining a sample mean as deviant as 102 if the true mean is 100 can be determined from

$$z = \frac{\bar{X} - \mu_0}{\sigma/\sqrt{n}} = \frac{102 - 100}{15/\sqrt{100}} = \frac{2.0}{1.5} = 1.33$$

and the cumulative normal probability table in Appendix D.3. According to Appendix D.3, the probability associated with obtaining a sample mean of 102 if the true mean is 100 is approximately .09. According to the decision rules outlined above, the null hypothesis is not rejected, because $.09 > .05$, and therefore z does not fall in the region for rejection of H_0. The regions for rejection or nonrejection of H_0 are illustrated in Figure 1.5-2. If the

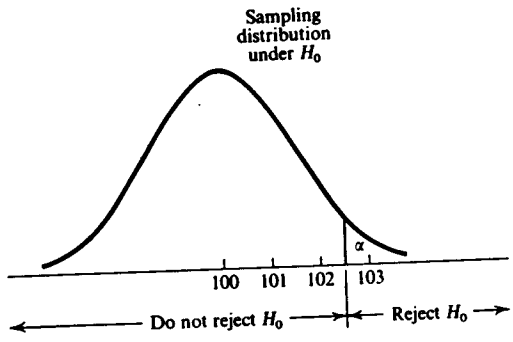

Figure 1.5-2 Regions of the sampling distribution of z that lead to rejection or nonrejection of H_0 according to decision rules specified previously.