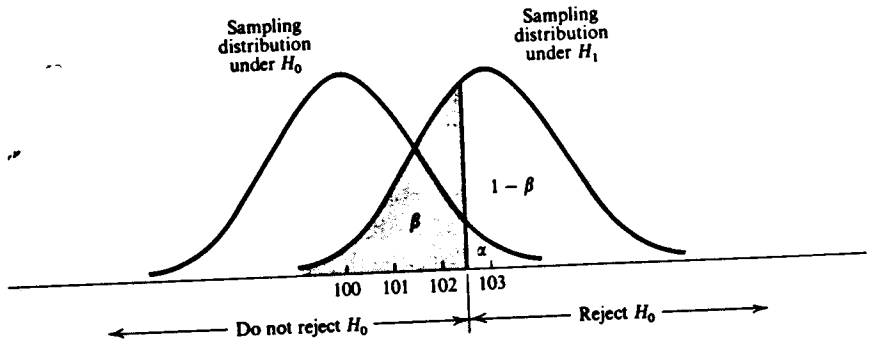

Figure 1.5-3 Regions corresponding to probabilities of making type I error (α) and type II error (β). The region corresponding to a type I error is determined by the experimenter when he specifies α and H_1. If, for a given H_0 and true alternative, α is made smaller, the probability of making a type II error is increased.

the parameter is equal to or less than 100, a correct decision has been made. On the other hand, if the parameter is equal to 103, a type II error has been made.

POWER OF A TEST

If the parameter is equal to 100, the probability of making a correct decision is $1 - \alpha$. If, on the other hand, the parameter is equal to 103, the probability of making a correct decision is $1 - \beta$. This latter probability is called the power of the test. It is simply the probability of deciding that H_0 is wrong, given a decision rule and the true value under H_1. The possible decision outcomes can be categorized as shown in Table 1.5-1.

TABLE 1.5-1 Decision Outcomes Categorized

		True Situation	
		$\mu = 100$	$\mu = 103$
Decision	$\mu = 100$	correct decision $= 1 - \alpha$	type II error $= \beta$
	$\mu = 103$	type I error $= \alpha$	correct decision $= 1 - \beta$

An experimenter attempts to select an experimental design and set of decision rules that will result in the highest power for a given type I