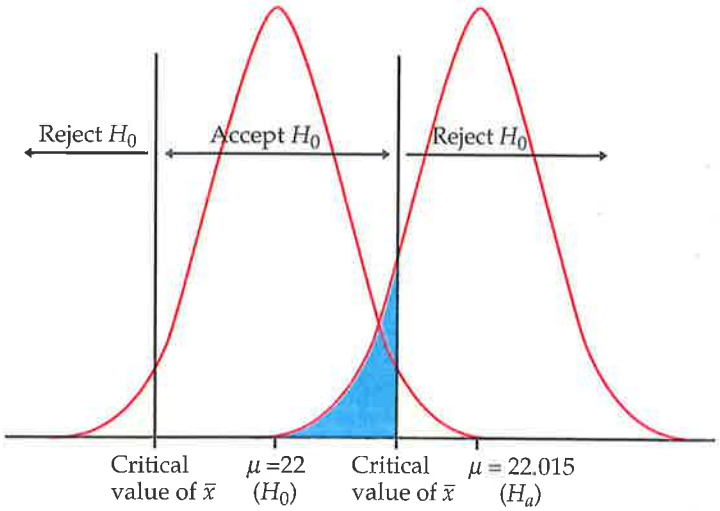


FIGURE 6.19 The two error probabilities for Example 6.32. The probability of a Type I error (yellow area) is the probability of rejecting H_0: $\mu = 22$ when in fact $\mu = 22$. The probability of a Type II error (blue area) is the probability of accepting H_0 when in fact $\mu = 22.015$.

TYPE I AND TYPE II ERRORS

If we reject H_0 (accept H_a) when in fact H_0 is true, this is a **Type I error.**
If we accept H_0 (reject H_a) when in fact H_a is true, this is a **Type II error.**

		Truth about the population: H_0 true	Truth about the population: H_a true
Decision based on sample	Reject H_0	Type I error	Correct decision
	Accept H_0	Correct decision	Type II error

FIGURE 6.17 The two types of error in testing hypotheses.

		Truth about the lot: Does meet standards	Truth about the lot: Does not meet standards
Decision based on sample	Reject the lot	Type I error	Correct decision
	Accept the lot	Correct decision	Type II error

FIGURE 6.18 The two types of error in the acceptance sampling setting.

POWER AND TYPE II ERROR

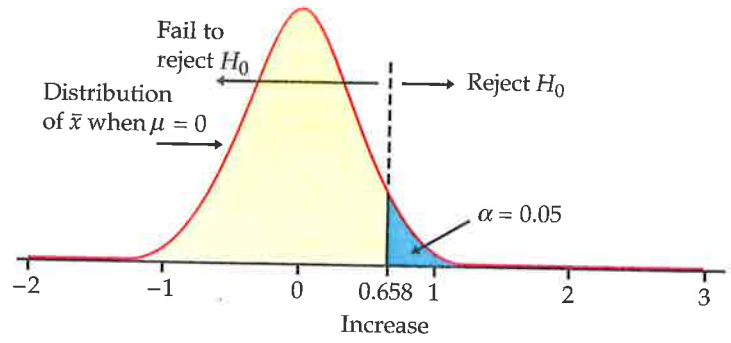
The power of a fixed level test to detect a particular alternative is 1 minus the probability of a Type II error for that alternative.

SIGNIFICANCE AND TYPE I ERROR

The significance level α of any fixed level test is the probability of a Type I error. That is, α is the probability that the test will reject the null hypothesis H_0 when H_0 is in fact true.

POWER

The probability that a fixed level α significance test will reject H_0 when a particular alternative value of the parameter is true is called the **power** of the test to detect that alternative.



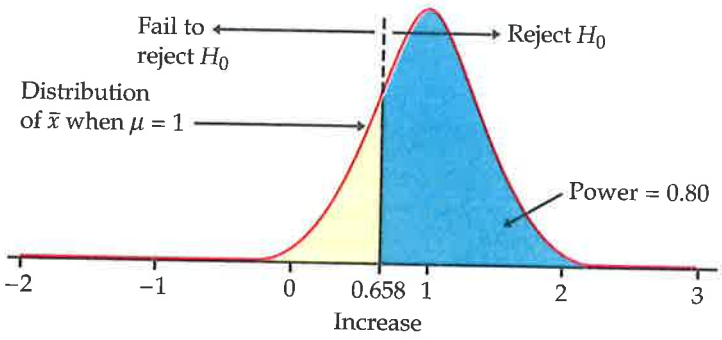


FIGURE 6.15 The sampling distributions of $\bar{x}$ when $\mu = 0$ and when $\mu = 1$. The power is the probability that the test rejects H_0 when the alternative is true.

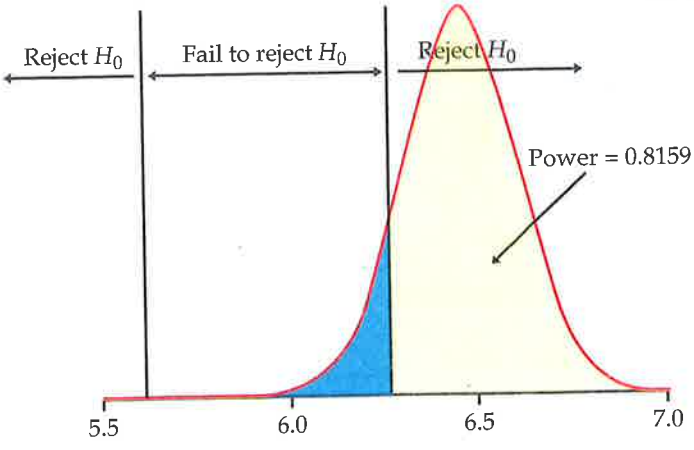


FIGURE 6.16 The power for Example 6.30. Unlike Figure 6.15, only the sampling distribution under the alterntive is shown.