



80% of companies in the United States now test employees and/or job applicants for drug use. One common approach to pre-employment drug screening is to require an initial urine test, such as the EMIT (enzyme multiplied immunoassay technique) test, which is a "five panel" test for the presence of any of five drugs: marijuana, cocaine, amphetamines, opiates, or phencyclidine. The EMIT test is one of the least expensive and most common tests used by employers. Most companies require that positive test results be confirmed by a more reliable GC-MS (gas chromatography mass spectrometry) test.

Drug testing is typically a process with some degree of inaccuracy, and results are sometimes wrong. Wrong results are of two types: (1) false positive results and (2) false negative results. These terms are included among several terms commonly used in references to drug testing. A subject getting a false positive result is in the very undesirable position of appearing to be a drug user when that person is not actually a drug user.

Analyzing the Results

Table 4-1 includes results from 1000 adults in the United States. If one of the 1000 subjects from Table 4-1 is randomly selected, what is the probability that the subject will test positive if this person is not a drug user? If one of the subjects from Table 4-1 is randomly selected, what is the probability that the subject will get a correct result? We will address such questions in this chapter.

- **False positive:** *Wrong* result in which the test incorrectly indicates the presence of a condition when the subject does not actually have that condition.
- **False negative:** *Wrong* result in which the test incorrectly indicates that the subject does *not* have a condition when the subject actually does have that condition.
- **True positive:** *Correct* result in which the test correctly indicates that a condition is present when it really is present.
- **True negative:** *Correct* result in which the test correctly indicates that a condition is not present when it really is not present.
- **Test sensitivity:** The probability of a true positive, given that the subject actually has the condition being tested.
- **Test specificity:** The probability of a true negative, given that the subject does not have the condition being tested.
- **Positive predictive value:** Probability that a subject is a true positive, given that the test yields a positive result (indicating that the condition is present).
- **Negative predictive value:** Probability that the subject is a true negative, given that the test yields a negative result (indicating that the condition is not present).
- **Prevalence:** Proportion of subjects having some condition.

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- 4-2 Basic Concepts of Probability
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- 4-4 Multiplication Rule: Basics
- 4-5 Multiplication Rule: Complements and Conditional Probability
- 4-6 Counting
- 4-7 Probabilities Through Simulations (on CD-ROM)
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Table 4-1 Pre-Employment Drug Screening Results

	Positive Test Result (Drug Use Is Indicated)	Negative Test Result (Drug Use Is Not Indicated)
Subject Uses Drugs	44 (True Positive)	6 (False Negative)
Subject Is Not a Drug User	90 (False Positive)	860 (True Negative)