

How reliable is a drug test?

The results of this problem will shake your faith in drug tests and others that are used to determine criminal or unethical behavior.

A drug test for cocaine is 95% accurate. It is also known that in a certain group of people, 0.5% do use cocaine. Suppose a person is chosen from this group at random, and the test comes out positive for cocaine. What is the probability that the person is actually a user? (Hint: Let U denote the event of choosing a user from the population for testing, N denote the event of choosing a non-user, $+$ denote the event of testing positive for cocaine, and $-$ the event of testing negative. What is $P(U | +)$?) (Ans: 0.087=8.7%) Now try it for 90% accuracy. (Ans: 0.043=4.3%)