1. A drug-screening test is used in a large population of people of whom 3% actually use drugs. Suppose that the false positive rate is 2% and the false negative rate is 4%. Thus a person who uses drugs tests positive for them 96% of the time and a person who does not use drugs tests negative 98% of the time. What is the probability that a randomly chosen person who tests positive for drugs actually uses drugs? Let \( D \) represent people that use drugs, \( C \) represent those people that are clean, \( P \) represent a positive result on the test, and \( N \) a negative result. We are interested in calculating \( P(D|P) \). We know from Bayes’ rule that

\[
P(D|P) = \frac{P(P|D)P(D)}{P(P|D)P(D) + P(P|N)P(N)} = \frac{.96 \cdot .03}{.96 \cdot .03 + .02 \cdot .97}
\]