

Math 171.02 Spring 2004
February 25, 2004
Conditional Probability

Example. Suppose that 80% of the population displaying certain symptoms has hepatitis. A patient with these symptoms is given a blood test to confirm the diagnosis of hepatitis. Suppose that this test is known to give positive results for 95% of people with hepatitis, but overall is known to give positive results to 85% of people who take the blood test. What is the probability that an individual who reacts positively to the test actually has hepatitis?

Solution. Let H be the event “has hepatitis when displaying certain symptoms.”

Let R be the event “reacts positively to blood test.”

We want: $P(H|R)$.

We are given: $P(H) = 0.80$, $P(R) = 0.85$, and $P(R|H) = 0.95$.

From today’s class, we have $P(H|R) = \frac{P(R|H) \cdot P(H)}{P(R)}$.

Therefore,

$$P(H|R) = \frac{0.95 \cdot 0.80}{0.85} = 0.894.$$