

Answer on question #4062 – Math – Statistics and Probability

The advantage of a certain blood test is that 90% of the time it is positive for patients having a certain disease. Its disadvantage is that 25% of the time it is also positive in healthy people. In a certain location 30% of the people have the disease, and anybody with a positive blood test is given a drug that cures the disease. If 20% of the time the drug produces a characteristic rash, what is the probability that a person from this location who has the rash had the disease in the first place?

Solution

The test is positive for 90% of 30% people who have the disease and 25% of 70% for those who don't have the disease.

Have disease and test positive: 27%;

Don't have the disease and test positive: 17.5%

Those who have the positive result and take the drugs is $27\% + 17.5\% = 44.5\%$

20% of 44.5% = 8.5% of all people have a rash. The probability that the person with a rash has disease is $27/44.5 \approx 0.6067$.

Answer: 0.6067.