/ /

Bayes Theorem Question

Q.3. A test for a disease is 99% accurate (true positive rate), and the disease occurs in 1 out of 1000 people.
Your test is positive. What is the probability you actually have the disease?

Soln. $P(\text{Accurate}) = 0.99$

$P(\text{Not Accurate}) = 0.01$

$P(\text{Disease}) = \frac{1}{1000} = 0.001$

$\therefore P(\text{Disease} / \text{When test is positive}) =$

$$\frac{P(\text{Disease}) \times P(\text{Accurate})}{P(\text{Disease}) \times P(\text{Accurate}) + (1 - P(\text{Disease})) \times P(\text{Not Accurate})}$$

$$= \frac{0.001 \times 0.99}{(0.001 \times 0.99) + (0.999 \times 0.01)}$$

$$= 0.09 = 9\%$$