$$P(S|T) = \frac{P(T|S)\,P(S)}{P(T)}$$

proba to be sick $= 0{,}01\%$

proba of a positive test $= 0{,}06\%$

probability that the test is positive given that you are sick!

$$P(S|T) = \frac{(1-0{,}001) \times 0{,}01\%}{0{,}06\%} = \boxed{0{,}1665}$$ so it is not much

In order to have more chance to be sure to be sick when you come back with a positive test, you take a second one.

We want to compute the following: $P(S|TT)$ and $P(S|T\bar{T})$, that account for the probability of being sick given 2 positive tests and the probability of being sick after the first test positive and the second negative respectively. To achieve that we will need to compute particular terms such as the following: $P(TT)$, $P(T\bar{T})$.

We know that:

- $P(S) = 0{,}000$
- $P(T|\bar{S}) = 0{,}0005$
- $P(S|T) = 0{,}1665$
- $P(\bar{T}|S) = 0{,}001$
- $P(T) = 0{,}0006$

$$P(S|TT) = \frac{P(TT|S) \times P(S)}{P(TT)}$$ frome Bayes' rule and respectively:

$$P(S|T\bar{T}) = \frac{P(T\bar{T})P(S)}{P(T\bar{T})}$$

So we need to compute $P(TT)$, $P(T\bar{T})$, $P(TT|S)$ and $P(T\bar{T}|S)$.

*) $P(TT) = P(TT|S)P(S) + P(TT|\bar{S})P(\bar{S})$

$= P(T|S)^2 P(S) + P(T|\bar{S})^2 P(\bar{S})$

$= 0{,}999^2 \times 0{,}0001 + 0{,}0005^2\, 0{,}9999 = \underline{1\,10^{-4}}$

*) $P(T\bar{T}) = P(T\bar{T}|S)P(S) + P(T\bar{T}|\bar{S})P(\bar{S})$

$= P(T|S)P(\bar{T}|S)P(S) + P(T|\bar{S})P(\bar{T}|\bar{S})P(\bar{S})$

$= 0{,}999 \times 0{,}001 \times 0{,}0001 + 0{,}0005 \times 0{,}9995 \times 0{,}9999$

$\approx \underline{5\,10^{-4}}$

Therefore, from those results, we can now compute $P(TT|S)$ and $P(T\bar{T}|S)$.

*) $P(S|TT) = \dfrac{P(TT|S) \times P(S)}{P(TT)}$

$$= \frac{P(T|S)^2 \, P(S)}{2\,10^{-4}} = 0{,}998$$

*) $P(S|T\bar{T}) = \frac{P(T\bar{T}|S)\,P(S)}{P(T\bar{T})}$

$$= \frac{P(T|S)\,P(\bar{T}|S)\,P(S)}{5\,10^{-4}} = 1{,}998\,10^{-4}$$

We can then conclude that by taking a second test we are way more sure of being sick or not.
If the second test is positive, then there is almost 100% chance (99,8%) that you are sick and if the second test is negative, then there is a ridicule $\simeq$ 0,2% chance that it is a false negative.