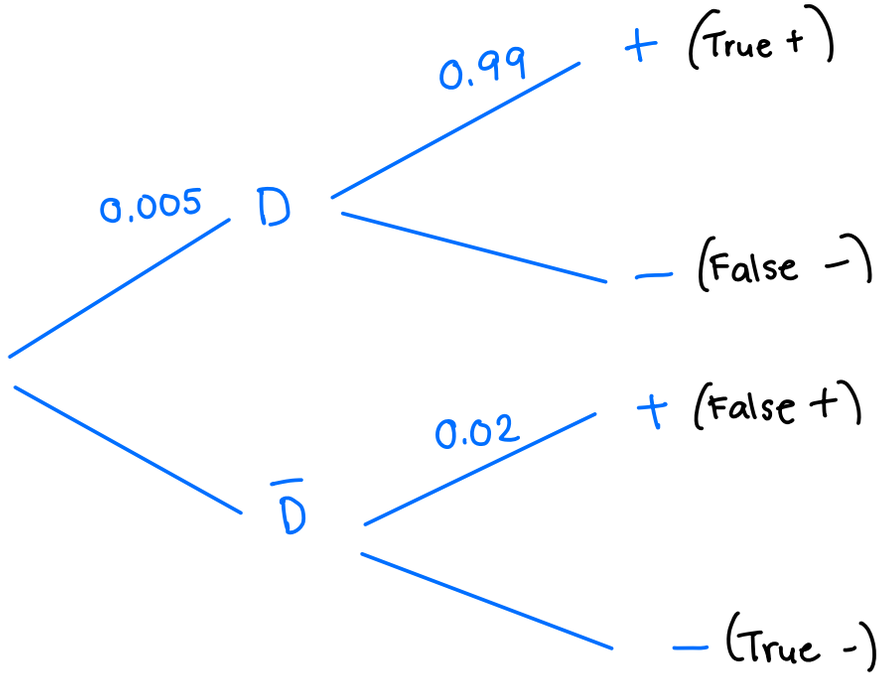
2% false positive —> 2% of healthy people incorrectly identified as sick $P(+|\bar{D}) = 0.02$
99% true positive —> if a person who has the disease gets tested, they have a
99% of testing positive (sensitivity) $P(+|D) = 0.99$
0.05% prevalence —> half a percent of the population have the disease $= P(D)$

Let D be the event that the person has the disease
Let P be the event that the person tests positive



$$P(D|+) = \frac{P(+|D) \cdot P(D)}{P(+)}$$

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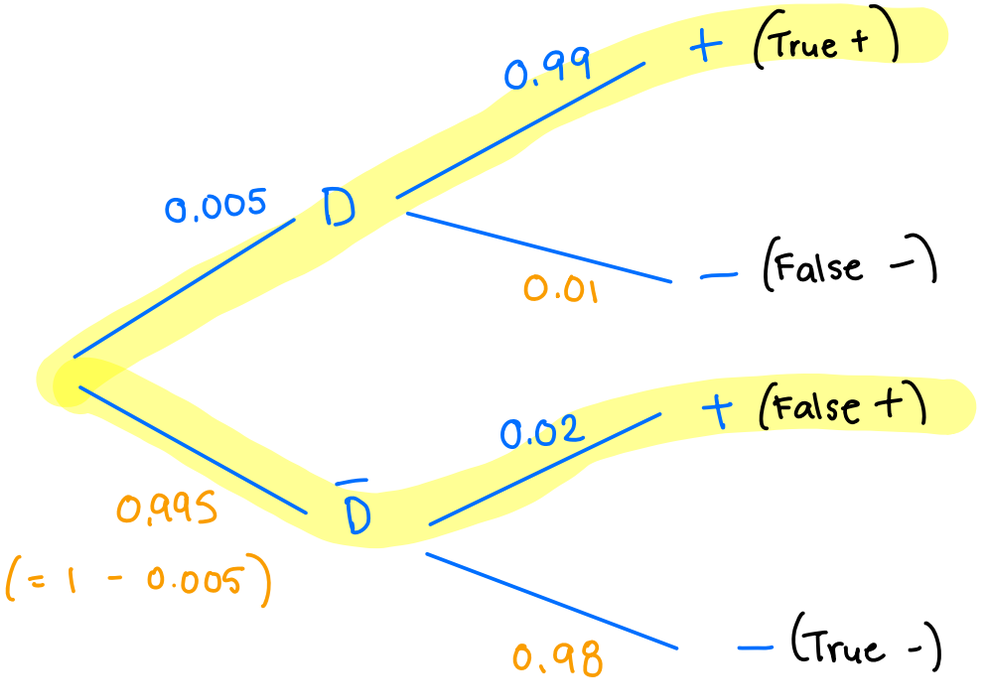

$P(+) = P(\text{True} + \cup \text{False} +)$
$= P(\text{True} +) + P(\text{False} +)$ M.E events
$= P(D \cap +) + P(\bar{D} \cap +)$
$= P(+|D) \cdot P(D) + P(+|\bar{D}) \cdot P(\bar{D})$
$= (0.99) \cdot (0.005) + (0.02)(0.995)$
$= 0.00495 + 0.0199$
$= 0.02485$

$$P(D|+) = \frac{P(+|D) \cdot P(D)}{P(+)} = \frac{0.00495}{0.02485} = 0.1991952 \approx 20\%$$