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1. False.

Even after infinite training there will be some error since Y is probabilistic and can't be predicted accurately and further Naive Bayes can't even estimate Probability of X perfectly.

3. (1) Patient is COVID positive } Hypotheses
(2) Patient is COVID negative }
Let +ve & -ve be events when (1) & (2) respectively

(+)ve (-)ve } outcomes

Probability of disease :

$P(+ve) = 0.08$ $P(-ve) = .92$

Let P_P & P_N be Predicted positive & Predicted negative.

$P(P_P / +ve) = .9$

$P(P_N / +ve) = .1$

$P(P_N / -ve) = .97$

$P(P_P / -ve) = .03$

Given: We got P_P i.e the kit predicted positive.

Now, $P(+ve / P_P) = ?$

$P(-ve / P_P) = ?$

$$P(+ve \mid P_p) = \frac{P(P_p \mid +ve) \times P(+ve)}{P(P_p)}$$

$$P(+ve \mid P_p) = \frac{.9 \times .08}{.9 \times .08 + .03 \times .92}$$

$$\Rightarrow P(+ve \mid P_p) = 0.772$$

$$P(-ve \mid P_p) = \frac{P(P_p \mid -ve) * P(-ve)}{P(P_p)}$$

$$= \frac{.03 \times .92}{.9 \times .08 + .03 \times .92}$$

$$= 0.277$$

$\because P(P_p) = P(P_p \mid +ve) P(+ve) * P(P_p \mid -ve) * P(-ve)$

Since the probability is only 0.772 we cannot surely say if person is COVID positive or not. But given people with symptoms test themselves and 0.772 is greater than 0.5 it has more chances that person is positive. (But no surity Hence cannot predict)

As mentioned probability of person being COVID +ve given test came out to be positive is 0.772

2.2

$P(+ve) = 0.6$

$P(-ve) = .4$

$$P(+ve \mid P_p) = \frac{P(P_p \mid +ve) * P(+ve)}{P(+ve) * P(P_p \mid +ve) + P(-ve) P(P_p \mid -ve)}$$

$$= \frac{.9 \times .6}{.6 \times .9 + .4 \times 0.03}$$

$$= .978$$

Probability of person being COVID positive given test came out to be positive is thus 0.978.