Lab 04 – 4.3

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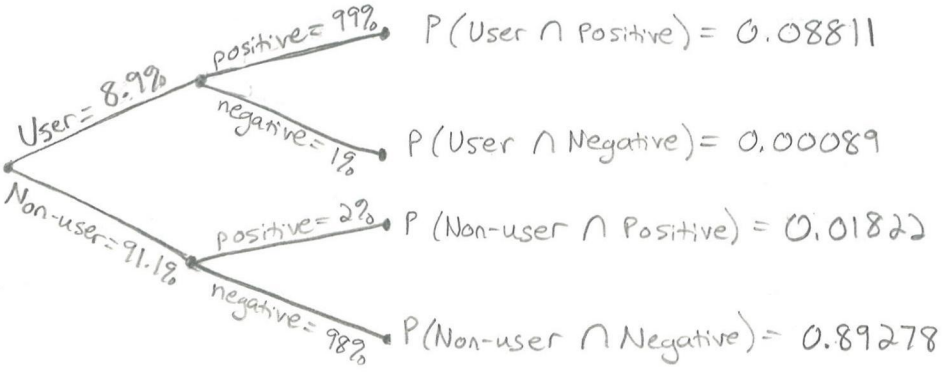
2/23/19

(A)



① $\mathbf{P}(User) = \langle P(User), P(Non\text{-}User) \rangle$
$= \boxed{\langle 0.089, 0.911 \rangle}$

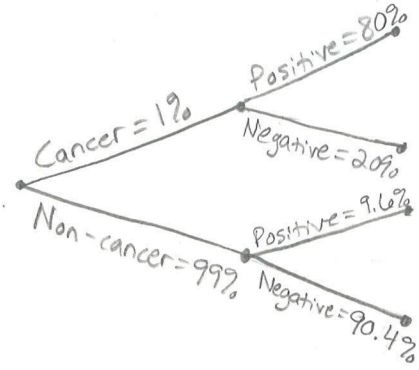
② $P(test \mid user) = \dfrac{P(user \mid test) \cdot P(test)}{P(user)}$
$= 0.08811 \cdot (0.08811 + 0.01822)$
$= 0.08811 \cdot 0.10633$
$= \boxed{0.00937}$

③ $P(-test \mid user) = \dfrac{P(user \mid -test) \cdot P(-test)}{P(user)}$
$= 0.00089 \cdot (0.00089 + 0.89278)$
$= 0.00089 \cdot 0.89367$
$= \boxed{0.000795}$

④ $P(test \mid -user) = \dfrac{P(-user \mid test) \cdot P(test)}{P(-user)}$
$= 0.01822 \cdot (0.08811 + 0.01822)$
$= 0.01822 \cdot 0.10633$
$= \boxed{0.001937}$

⑤ $\mathbf{P}(User \mid test) = \langle P(User \cap test), P(-User \cap test) \rangle$
$= \langle (0.08811 \cdot 0.089), (0.01822 \cdot 0.911) \rangle$
$= \boxed{\langle 0.00784, 0.016598 \rangle}$

(B)



$P(\text{Cancer} \cap \text{Positive}) = 0.008$

$P(\text{Cancer} \cap \text{Negative}) = 0.002$

$P(\text{Non-cancer} \cap \text{Positive}) = 0.09504$

$P(\text{Non-cancer} \cap \text{Negative}) = 0.89496$

$$P(\text{Cancer} \mid \text{Positive}) = \frac{P(\text{Positive} \mid \text{Cancer}) \cdot P(\text{Cancer})}{P(\text{Positive})}$$

$$= \frac{0.008 \cdot 0.01}{0.008 + 0.09504}$$

$$= \frac{0.00008}{0.10304}$$

$$= \boxed{0.0007764}$$ (chances she does have cancer given positive)

$$P(\text{Non-cancer} \mid \text{Positive}) = \frac{P(\text{Positive} \mid \text{Non-cancer}) \cdot P(\text{Non-cancer})}{P(\text{Positive})}$$

$$= \frac{0.09504 \cdot 0.99}{0.008 + 0.09504}$$

$$= \frac{0.0940896}{0.10304}$$

$$= \boxed{0.91313665}$$ (chances she does NOT have cancer given positive)