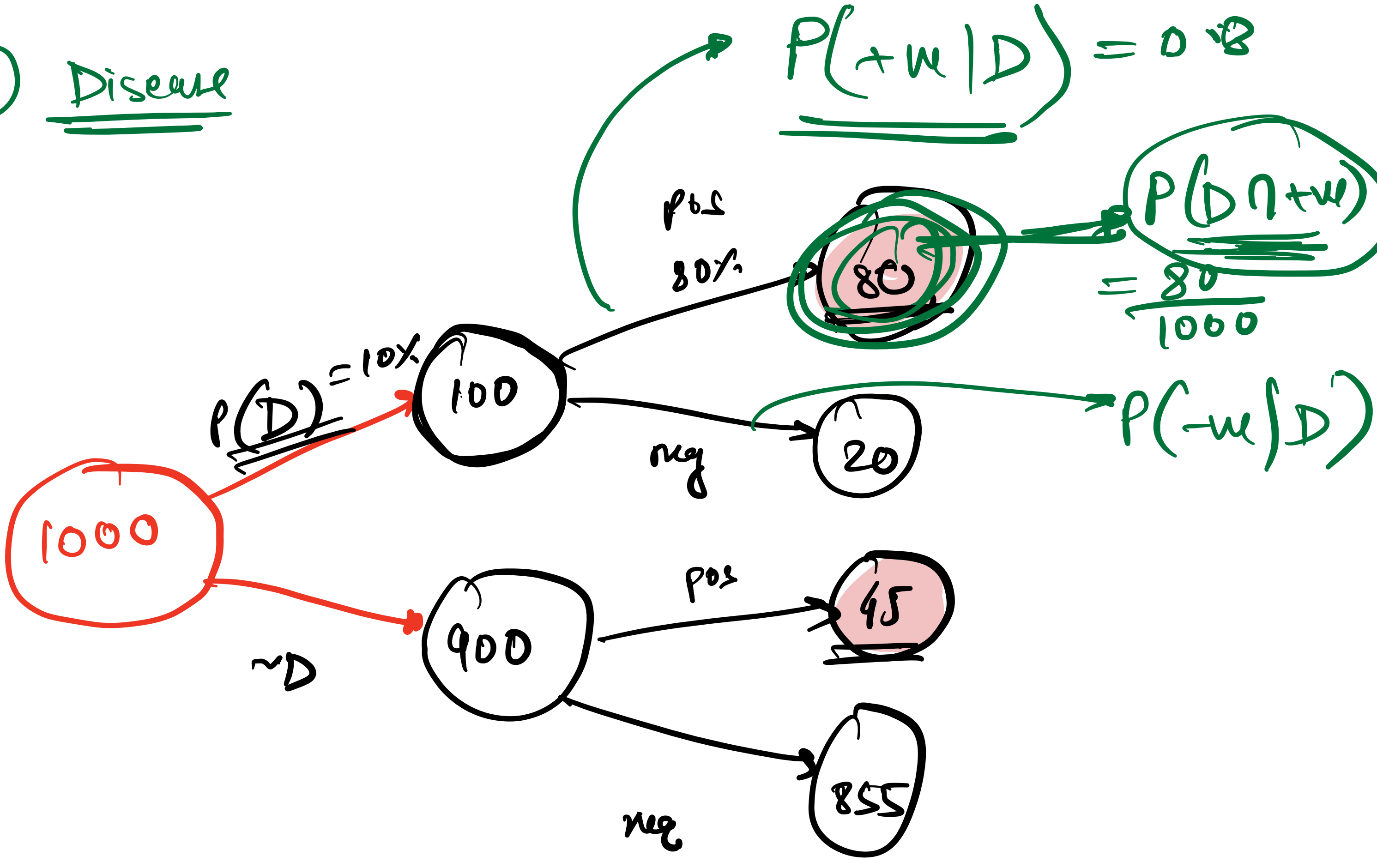
★ Baye's Theorem - 1

$$\boxed{P(A|B) = \frac{P(A \cap B)}{P(B)}}$$

① Disease



$$P(+ve) = \frac{80+45}{1000} \rightarrow 12.5\%$$

(Q.2) Suppose you are tested positive, what is the prob that you have the disease?

$$\boxed{P(D \mid Pos)}$$

→ if you are positive, then you belong to (80 + 45) people.

Among these, only 80 have disease

$$P(D \mid +ve) = \frac{80}{(80+45)}$$

$$= \underline{\underline{64\%}}$$

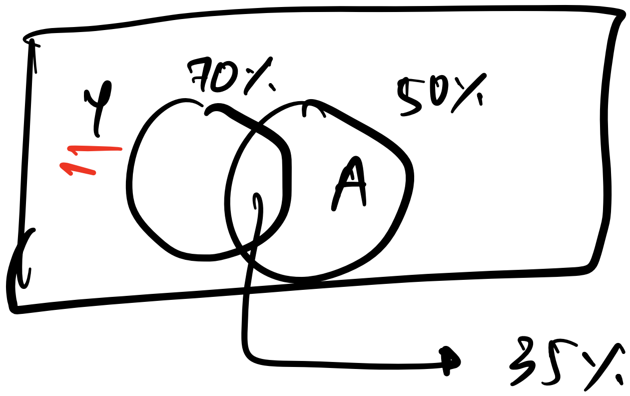
$$P(D \mid +ve) = \frac{P(D \cap +ve)}{P(+ve)}$$

$$P(+ve \mid D) = \frac{P(D \cap +ve)}{P(D)}$$

$$P(D \cap +ve) = \boxed{P(+ve \mid D) * P(D)}$$

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

Baye's Thm



$P(Y) = 70\%$

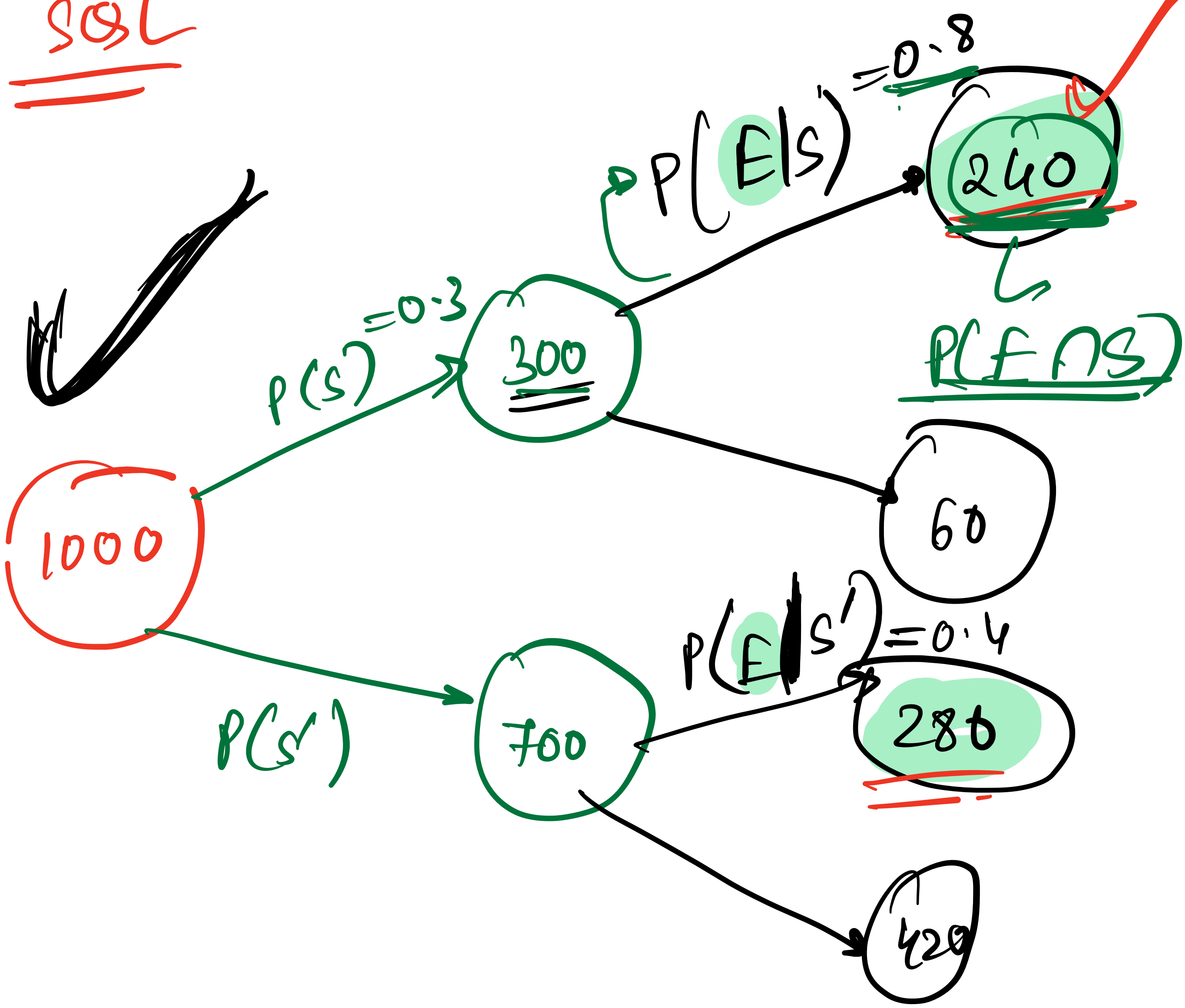
If a person saw ad on Amazon $\rightarrow$ what is prob of watching ad on Youtube?

$$P(Y|A) = \frac{P(Y \cap A)}{P(A)}$$

$$= \frac{35}{50}$$

$$P(E) = \frac{240+280}{1000} = \frac{520}{1000}$$

SOL



$$P(S|E) = ?$$

$$= \frac{240}{240+280}$$

Ap 2 :- using formula

$$P(S|E) = \frac{\boxed{P(S \cap E)}}{P(E)}$$

$$P(E|S) = \frac{P(E \cap S)}{P(S)}$$

$$P(E \cap S) = \boxed{P(E|S) \times P(S)}$$

$$P(S|E) = \frac{P(E|S) \times P(S)}{P(E)}$$

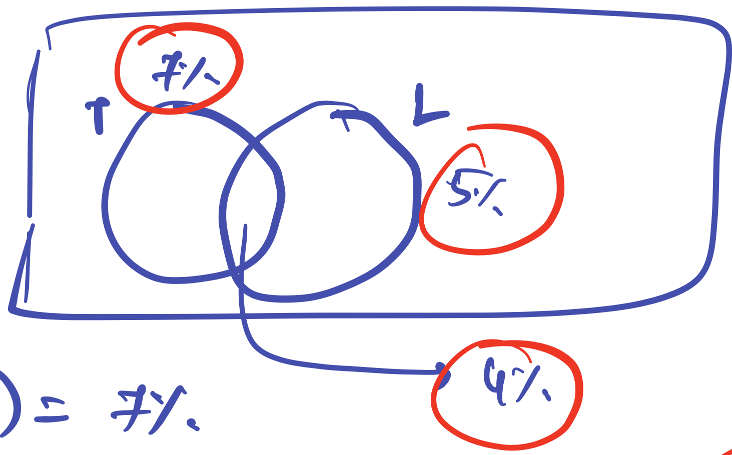
$$= \frac{0.8 \times 0.3}{\frac{240+280}{1000}}$$

$$P(E) = \underline{\underline{P(E \cap S)}} + P(E \cap \sim S)$$

$$= P(E|S) \times P(S) + P(E|\sim S) \times P(\sim S)$$

$$= \underline{\underline{0.52}}$$

* Independent events



$P(T) = 7\%$

$P(L) = 5\%$

$P(T \cap L) = 4\%$

$P(T) = 0.07$

(0.2) ~~$P(T) = ?$~~

$P(T) \neq P(T \mid L)$

$$P(T \mid L) = \frac{P(T \cap L)}{P(L)}$$

extra

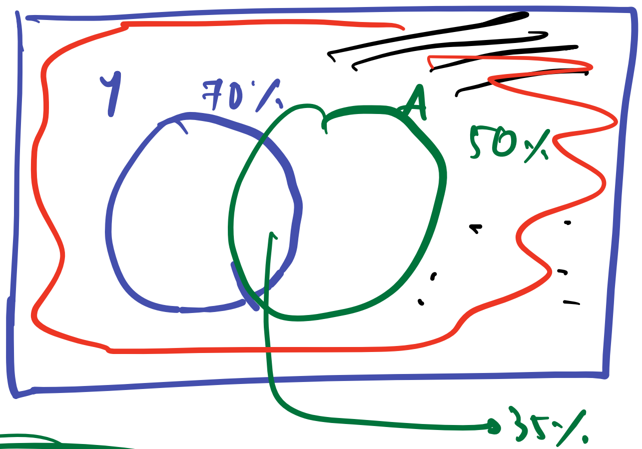
$$= \frac{4\%}{5\%} = 0.8 \quad (80\%)$$

Note:- The extra information that a person is on LinkedIn does increase/(Dec)

obs 1

in the prob of them being on Twitter.

(Q.3) Website:



$P(Y) = 70\%$

$P(A) = 50\%$

$P(Y \cap A) = 35\%$

$\rightarrow P(Y) = 70\%$

(Q.4)

$$P(Y \mid A) = \frac{P(Y \cap A)}{P(A)}$$

Additional info

$$= \frac{35}{50}$$

$$= 70\%$$

Obs :- Additional info NOT affecting prob of seeing on YT.

★ Independent events

A and B are independent events

if $\boxed{P(A|B) = P(A)}$

$$\frac{P(A \cap B)}{P(B)} = P(A)$$

$$\boxed{P(A \cap B) = P(A) * P(B)}$$

→ whenever this is true

A & B → independent events

$P(Y|A)$ → Among the people who have watched ad on Amazon, what is the prob of them watching ad on YT.

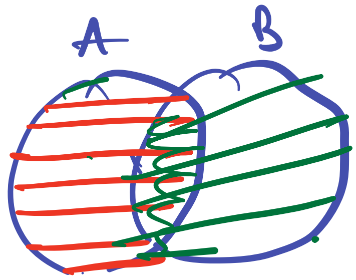
(Q) A and B are two independent events.

where it is known that

$P(A \cup B) = 0.5$

$P(A) = 0.3$

$P(B) = ?$



$P(A \cup B) = P(A) + P(B) - \boxed{P(A \cap B)}$

As A & B are independent

$$\boxed{P(A \cap B) = P(A) * P(B)}$$

$$P(A \cup B) = P(A) + P(B) - P(A) * P(B)$$

$$0.5 = 0.3 + P(B) - 0.3 * P(B)$$

$$-0.2 = 0.7 * P(B)$$

$$-P(B) = \frac{0.2}{0.7} \sim 2/7$$

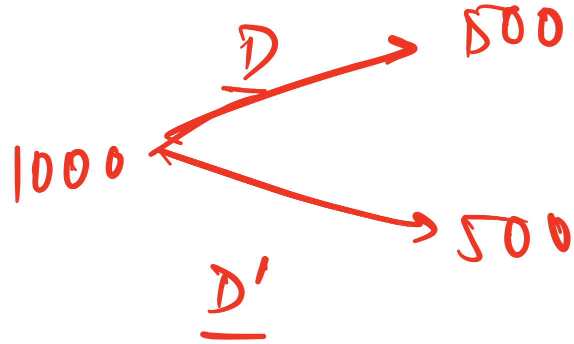
$$1 * P(B) - 0.3 \; P(B)$$

$$P(B)(1 - 0.3) = 0.7 * P(B)$$

Imp From feat

If A and B are mutually exclusive, then A and B CANNOT be independent.

Doubts



ADY