

A: answered correctly

B: knows ans.

$$P(\$|A) = ?$$

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

$$P(B) = p$$

$$P(A|B^c) = \frac{1}{m}$$

$$= \frac{mp}{mp + (1-p)}$$

$P(\text{answ. correct} | \text{knows})$

$$\frac{P(A|B)P(B)}{P(A|B)P(B) + P(A|B^c)P(B^c)}$$

## Odds of an event

$$\Rightarrow \frac{P(A)}{P(A^c)} = \frac{p}{1-p}$$

$$= \frac{\text{event occur}}{\text{event not occur}}$$

(how more likely it is to have event A than not having it)

Ex: if  $P(A) = 2/3$

odds = ?     2

$$\frac{\text{Guilty}}{=} = 60\%$$

$$= 20\%$$

C = convinced of guilt

A = he having that characteristic

$$\frac{\text{Convinced}}{P(C)} = 0.6$$

$$P(C^c) = 0.4$$

$$P(A|C) = 1$$

$$P(A|C^c) = 0.2$$

To find:  $P(C|A) = \frac{P(A|C) \cdot P(C)}{P(A|C)P(C) + P(A|C^c)P(C^c)}$

$$= 0.882$$



Q An urn consist of 2 type A coins & 1 type B coin.

When coin A is flipped, coins heads with  $P = 1/4$  ✓

When coin B is flipped, " " "  $P = 3/4$  ✓



Coin is randomly chosen & flipped. Given that flip lands on heads, prob that it is type A coin? find the odds of type A coin

Sol:

Given:

$$P(H|A) = \frac{1}{4}$$

$$P(H|A^c) = \frac{3}{4}$$

$$P(A) = \frac{2}{3}, P(A^c) = \frac{1}{3}$$

A: type A coin  
H: heads

To find:  $P(A|H)$

$$= \frac{2}{5}$$

odds =  $\frac{2}{3}$

Law of total probability.

$$P(E) = \sum_{i=1}^n P(E|F_i) P(F_i) \leftarrow$$

$$P(E) = P(E|F_1)P(F_1) + P(E|F_2)P(F_2)$$

$$E = \bigcup_{i=1}^n E F_i$$

$$E = \sum_{i=1}^n E F_i$$

( $F_i$  are mutually exclusive).



$$E = \sum_{i=1}^n E F_i$$

$$P(E) = \sum_{i=1}^n P(E F_i)$$

$$= \sum_{i=1}^n P(E|F_i) P(F_i)$$

$i=1 \text{ \& \& } 2$

$$P(E|F_1) P(F_1) + P(E|F_2) P(F_2)$$

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

$$P(AB) = P(A|B) P(B)$$