$P(A') = 1 - P(A)$

$P(A \cap B') = P(A) - P(A \cap B)$

$P(B \cap A') = P(B) - P(A \cap B)$

Addition Rule

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

"Demorgan's Law"

$P(A \cap B') = P(A \cup B)'$
$= 1 - P(A \cup B)$

$P(A \cup B') = P(A \cap B)'$
$= 1 - P(A \cap B)$

conditional probability

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

A given B

Mutually exclusive

$P(A \cap B) = 0$

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

independents events

[multiplication Rule]

$P(A \cap B) = P(A) * P(B)$

$P(A \cup B) = P(A) + P(B)(1 - P(A))$

RR (Relative Risk)

$RR = \frac{P(B|A)}{P(B|A')} = \frac{\text{Risk for exposure}}{\text{Risk for unexposure group}}$

exposure

unexposure

Total probability

$P(A) = \sum P(A|B_n) * P(B_n)$

$= P(A|B_1) * P(B_1) + P(A|B_2) * P(B_2) \dots$

Bayes Rule and screening tests

B: disease

A: test

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

PV+ $\rightarrow P(D|+)$

PV- $\rightarrow P(\text{No D}|-)$

sensitivity $\rightarrow P(+|D)$

specificity $\rightarrow P(-|\text{No D})$

Bayes Rule...

$P(B|A) = \frac{P(A|B) * P(B)}{P(A|B) * P(B) + P(A|B') * P(B')}$

Generalized Baye's Rule...

$P(B_n|A) = \frac{P(A|B_n) * P(B_n)}{\sum P(A|B_n) * P(B_n)}$

$P(\bar{A}|\bar{B}) = 1 - P(A|\bar{B})$