S12 - 0.0 - Probability Cheat Sheet

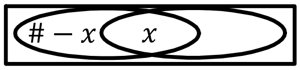
Logic | Guess and Check

Venn Diagrams

$A \cup B = A + B - A \cap B$

$A \cup B = A + B$ | Mutually Exclusive $A \cap B = 0$

$A \cup B \cup C = A + B + C - A \cap B - A \cap C - B \cap C + A \cap B \cap C$



$let\ x =$

Set Notation

And : $\cap$ | Not : @ | $\bar{A} = A'$

Or : $\cup$

Demorgan's Law

$\bar{A} \cap \bar{B} = \bar{A} \cup \bar{B}$ | $(\overline{A \cap B}) = \bar{A} \cup \bar{B}$

$\bar{A} \cup \bar{B} = \bar{A} \cap \bar{B}$ | $(\overline{A \cup B}) = \bar{A} \cap \bar{B}$

Probability $P(A) = Probability\ of\ Event\ A$

$$P(A) = \frac{\#\ Favourable\ Events}{Sample\ Space}$$

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

Bays Theorem | $(A|B)$; $A\ Given\ B$

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

Independence $P(B|A) = P(B)$ | $given$: |

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

$P(A \cup B) = 1 - P(\bar{A} \cap \bar{B})$ | $P(\bar{A}) = 1 - P(A)$ **Compliment**

$P(B|A) \neq^{*} P(A|B)$

$P(A \cup B) = P(A) + P(B)$ | Mutually Exclusive | $P(A \cap B) = 0$

$P(A \cap B) = P(A)P(B)$ | Independent | $P(B|A) = P(B)$

$P(A, B)$: Probability of A then B

Probability of an Event must be between 0 and 1. $0 \leq P(A) \leq 1$

$P_1 + P_2 + \cdots + P_n = 1$ | $\sum P(x) = 1$

$P(certain) = 100\%$

$P(impossible) = 0\%$

$P(x \geq 1) = 1 - P(none)$

$P(x \geq 2) = 1 - P(x \leq 1)$

$P(x \geq A) = 1 - P(x \leq (A - 1))$

5% Rule (w/w/out rep)

Sample $\leq$ 5% of population

Dependent→Independent

Fundamental Counting Principle | $a \times b \times c$ | Factorial Notation! | Repeats?

Blanks ___ , ___ , ___ | $\frac{\#\ options}{options}$ | $\times \div\ 2\ or\ \#!$

with/replacement/w/out rep

Given!

Tree Diagrams | Table | $(outcomes\ per\ trial)^{number\ of\ trials}$ | $All - None$

Multiply Branches

Add Leaves

$Cannot = All - Can$

$Circle$: $(n-1)!$

Cases! Cases: Multiply within cases, add separate cases.

Identical Objects $$\frac{(\#\ of\ letters)!}{(repeating\ letter)!\,(other\ repeating\ letter)! \ldots}$$

$$Paths\ in\ Squares: \frac{(l+w)!}{l!\,w!}$$

$$Paths\ in\ Cubes: \frac{(l+w+h)!}{l!\,w!\,h!}$$

Combinatorics Formulas $n \geq r$

Permutations: Order Matters

$$_nP_r = \frac{n!}{(n-r)!}$$

$$_nC_r = \frac{_nP_r}{r!}$$

Combinations: Doesn't Matter

$$_nC_r = \frac{n!}{r!\,(n-r)!}$$

$$\binom{n}{r}$$

Binomial Theorem $t_{k+1} = {}_nC_k a^{n-k} b^k$; $(a+b)^n$; $n + 1\ terms$;k is always one less than the term number.

Odds

Favourable Outcomes : Unfavourable Outcomes | $part : part$