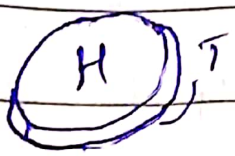
DATE: __ __ ____

#5

Compound probability of independent events:



$P(H) = \frac{1}{2}$ $P(T) = \frac{1}{2}$

$P(HH) = \frac{1}{4} = P(H_1)\,P(H_2)$

$= \frac{1}{2} \times \frac{1}{2}$

HH
HT
TH
TT

$P(THT) = \frac{1}{8} = P(T_1)\,P(H_2)\,P(T_3)$

$= \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

$= \frac{1}{8}$

#6 Coin Flipping probability:

for 3 flips

P(atleast 1 H in 3 flips) $= \frac{7}{8}$

P(at least one H) = P(Not getting all tails in 3 flips)

= 1 − P(getting all tails in 3 flips)

$= 1 - \frac{1}{8} = \frac{7}{8}$

DATE:

$P(\text{At least one head in 10 flips})$

$= P(\text{Not all tails in 10 flips})$

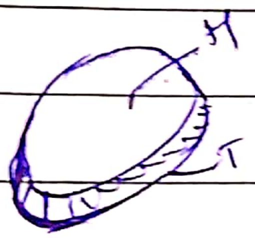
$= 1 - P(\text{all tails in 10 flips})$

$= 1 - \frac{1}{2^{10}}$

$= \frac{1023}{1024} = 99.9\%$

#7

probability without equally likely events:



unfair coin

$P(H) = 60\% = 0.6 = \frac{6}{10} = \frac{3}{5}$

$P(T) = 100\% - P(H)$

$= 100\% - 60\%$

$= 40\% = 0.4 = \frac{4}{10} = 2/5$

$P(H_1 H_2) = P(H_1)\,P(H_2) = 0.6 * 0.6$

$= 0.36$

$= 36\%$

$P(T_1 H_2 T_3) = P(T_1)\,P(H_2)\,P(T_3)$

$= 0.4 * 0.6 * 0.4 = 0.096$

$= 9.6\%$

#8 Getting exactly two heads Combinatorics :-

Fair coin: Flip 4 times

P(exactly one "Heads")

Total posibilities = 16

P(exactly 1 heads) = $P(HTTT) + P(THTT) + P(TTHT)$
$+ P(TTTH)$

$= \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} = \frac{4}{16} = \frac{1}{4}$

P(exactly 2 heads) $= \frac{6}{16} = \frac{3}{8}$

H_A H_B

$\underset{1}{\underline{H_B}}$ $\underset{2}{\underline{\quad}}$ $\underset{3}{\underline{H_A}}$ $\underset{4}{\underline{\quad}}$

4 place 3 places
$= 4 \times 3 = 12$ dift scena..

H_A H_B
H_B H_A

$= \frac{12}{2} = 6$ dift scenar..

$= \frac{6}{16}$

#9 Exactly 3 heads in five flips

Fair coin: 5 flips

p(exactly 3 heads) H_A H_B A_C

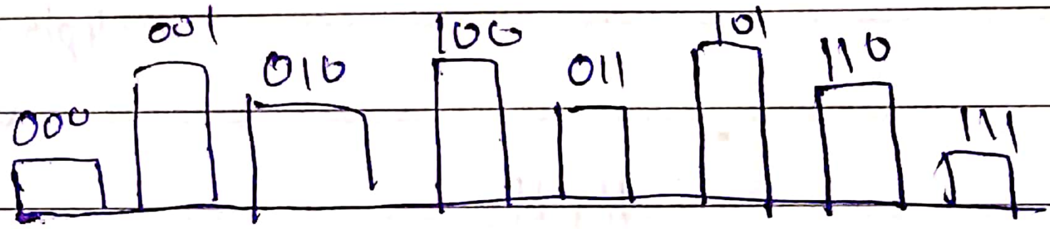
$\underline{}_1$ $\underline{H_A}_2$ $\underline{H_B}_3$ $\underline{}_4$ $\underline{}_5$

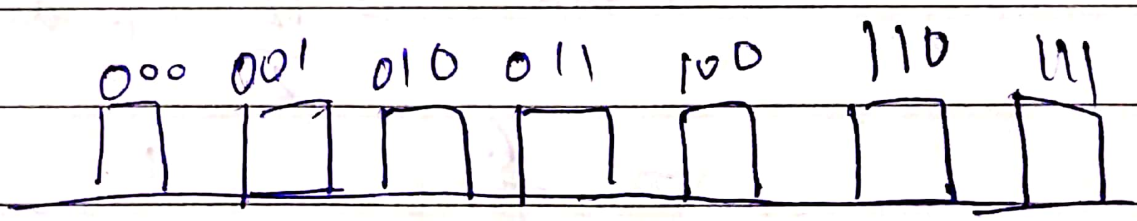
H_A — 5 possibilities
H_B — 4 possibilities
H_C — 3 possibilities $= 5\times4\times3 = 60$

$$5C_3 = \frac{5\times4\times3}{3\times2\times1} = 10 \qquad = \frac{10}{2^5}$$

$$p(\text{exactly 3 heads}) = \frac{10}{2^5} = \frac{10}{32} = \frac{5}{16}$$

#10 Frequency stability property:



random


Generalizing with binomial coefficients

P(k heads in n flips of the fair coin)

$\_\ \_\ \_\ \_\ \_\ \ldots = 2^n$ possibilities

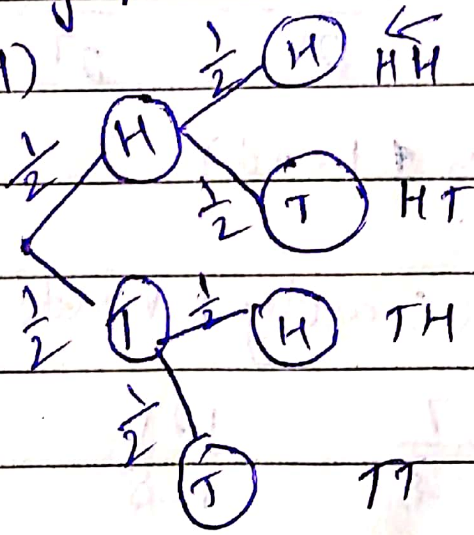
$$\underbrace{n(n-1)(n-2)\cdots(n-(k-1))}_{k \text{ times}} = {}^nC_k$$

$$= \frac{{}^nC_k}{2^n} = \frac{n! / (n-k)!\,k!}{2^n}$$

$${}^nC_k = \frac{n!}{(n-k)!\,k!}$$

probability part 2 :

$P(H\,H)$



$\leftarrow \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$

$$P(1H, 1\text{ tail}) = P(TH) + P(HT)$$
$$= P(TH \cup HT) = \frac{2}{4} = \frac{1}{2}$$

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$P(5 \text{ heads in a row}) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

$= \left(\frac{1}{2}\right)^5 = \frac{1}{32}$

$P\left(\begin{matrix}\text{out of 7 times} \\ \text{not getting any heads}\end{matrix}\right) = P(\text{getting 7 tails in a row})$

$= \left(\frac{1}{2}\right)^7$

$= \frac{1}{128}$

probability part 13:

Fair coin: Flip 7 times

$P(HHHHHHT) = \frac{1}{128} = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times$

$p(\text{exactly 1 heads}) = \frac{{}^nC_k}{2^n} = \frac{{}^7C_1}{2^7} = \frac{7}{128}$

$p(\text{not getting exactly 1 head})$

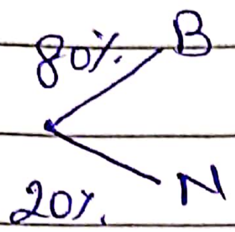
$= 1 - P(\text{exactly 1 heads})$

$= 1 - \frac{7}{128} = \frac{121}{128}$

DATE:

Free throw   80% there is a basket

20% there is No basket



P(3 baskets in a row)

$P(BBB) = 0.8 \times 0.8 \times 0.8$

$= 0.512$

$= 51.2\%$

⇒ 1 pt behind, 01 second,

got 3 free throws.

P(Tie) = P(atleast one FT)

= 1 − P(not getting any free throws