Date..............

12/05/2020

LESSON 4 : Probability

- fair coin

$P(HEADS) = 0.5$
$P(TAILS) = 0.5$

- Loaded coin.

→ Loaded coin is a coin that generally comes up with same value most of the time.
→ suppose, Head always come then,

eg.1 $P(HEAD) = 1 \Rightarrow 100\%$
$P(TAIL) = 0 \Rightarrow 0\%$

$\therefore$ $\boxed{P(HEAD) + P(TAIL) = 1}$

eg.2 $P(HEADS) = 0.75$
$P(TAILS) = \boxed{0.25}$

$\therefore$ $\boxed{P(A) = 1 - P(\neg A)}$

- Flipping two coins

Q. what is the probability both coins will be head.
{Head, Head} $P(Head) = 0.5$

$P(H,H) = P(H) \times P(H)$
$= 0.5 \times 0.5$
$= 0.25$

TRUTH TABLE FLIP-1	FLIP-2	
H	H	0.25
H	T	0.25
T	H	0.25
T	T	0.25

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Q. This time uses the loaded coin:

P (H, H) = ? P (H) = 0.6
P (T) = $\boxed{0.4}$

TRUTH TABLE

FLIP-1	FLIP-2	
H	H	$\boxed{0.36}$
H	T	$\boxed{0.24}$
T	H	$\boxed{0.24}$
T	T	$\boxed{0.16}$

= 1

P (H, H) = P(H) × P (H)
= 0.6 × 0.6
= 0.36

Q. P (H, H) = ? P (H) = 1
P (T) = 0

P (H, H) = 1

TRUTH TABLE

FLIP-1	FLIP-2	
H	H	1
H	T	0
T	H	0
T	T	0

Q. P (Exactly one H) = $\boxed{0.5}$ P (H) = 0.5
P (T) = 0.5

TRUTH TABLE

FLIP-1	FLIP-2	
H	H	0.25
H	T	0.25
T	H	0.25
T	T	0.25

= 0.5

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7. 3 FLIPS

Q. P(Exactly one H) = $\boxed{}$ P(H) = 0.5

P(T) = 0.5

TRUTH TABLE

FLIP-1	FLIP-2	FLIP-3	
H	H	H	=
H	H	T	
H	T	H	
T	T	T	
T	T	H	= 0.125
T	H	T	= 0.125
H	T	T	= 0.125
T	H	H	

$\left.\begin{matrix} 0.125 \\ 0.125 \\ 0.125 \end{matrix}\right\} 0.375$

Q P(Exactly one H) Loaded coin P(H) = 0.6

P(T) = 0.4

TRUTH TABLE

FLIP-1	FLIP-2	FLIP-3	
H	H	H	
H	H	T	
H	T	H	
H	T	T	= 0.6×0.16 =0.096
T	H	H	
T	H	T	= 0.6×0.16
T	T	H	= 0.6×0.16
T	T	T	

0.288

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→ Fair - Die

Fair Die
$P(\,) = 1/6$

$P(\text{Die} = \text{Even}) = \boxed{0.5}$

Q. Throw a fair Dice Twice

$P(\text{Double}) = \boxed{0.166}$

$6 \rightarrow$ Doubles
$1/6 = 0.166$

→ We can get generic rules from above:

1. The probability of any event must be b/w 0 & 1, inclusive.

2. The probability of the complement event is 1 minus the probability of an event. That is the probability of all other possible events is 1 minus the probability an event itself. Therefore, the sum of all possible events is equal to 1.

3. If our events are independent, then the probability of the string of possible events is the product of those events. That is the probability of one event AND the next AND the next event, is the product of those events.