

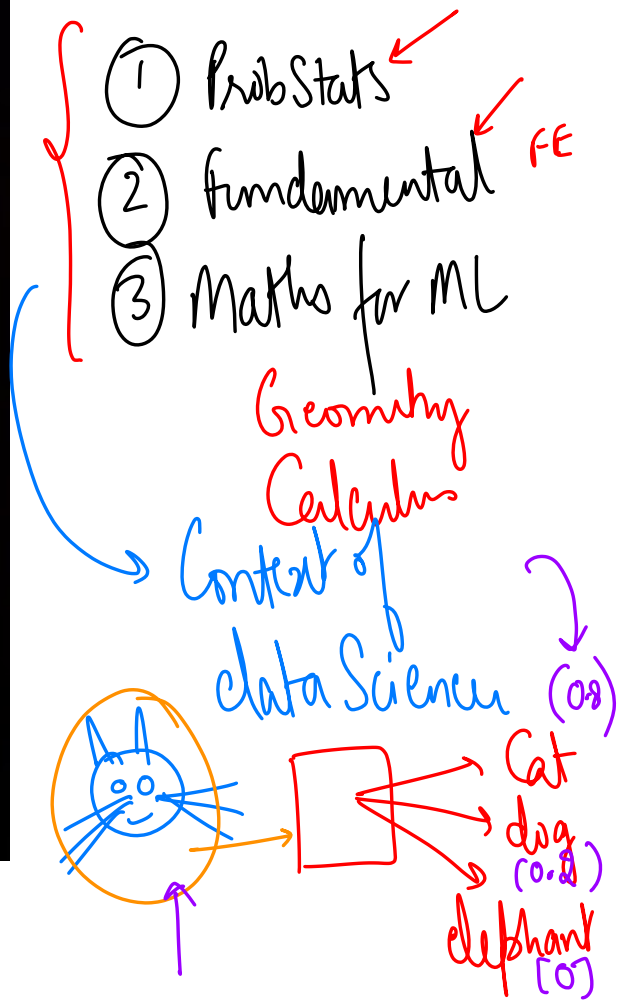
PROBABILITY

BASIC DEFINITIONS

Say you will learn AI, nobody panics



But say you will learn probability and statistics, then everybody loses their minds

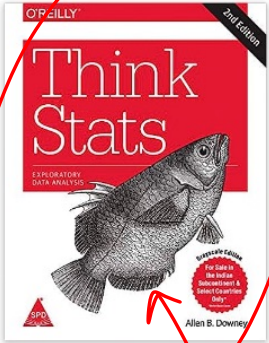


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Paperback – 1 November 2014

by Allen Downey (Author)

4.0 ★★★★★ 28 ratings

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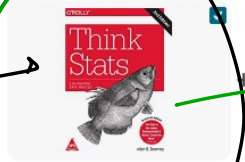
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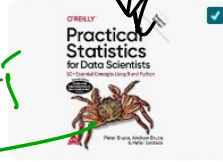
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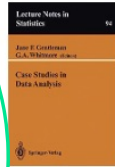
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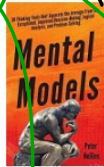
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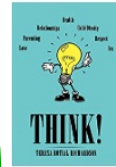
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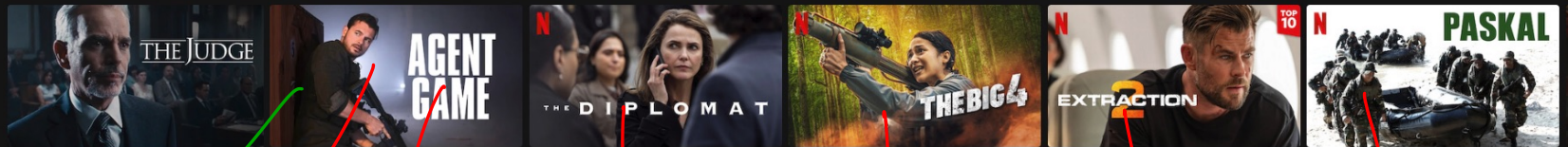
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My List

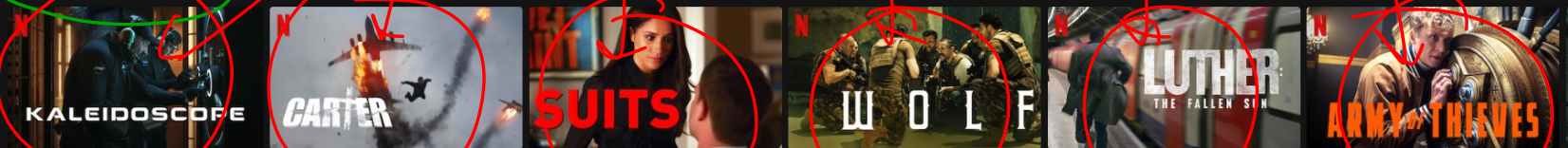


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Continue Watching for Nikhil



Top Picks for Nikhil



Trending Now



Recommender System → Content ←
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Basic Terminologies

⇒ Experiment



"deterministic experiment".

- ① Rolling a die ⇒ 1 to 6
- ② Deck ⇒ 52
- ③ Match ⇒ Win/Loss
- ④ Stocks ⇒ Profit/Loss
- ⑤ Coin flip ⇒ Head/Tails

Uncertainty Involved

"Probabilistic Experiments"

Experiment
Rolling a dice

Outcomes

Sample Space

Events

$\{ \}$ Set

Outcomes: $\{1\}, \{2\}, \{3\}, \{4\}, \{5\}, \{6\}$

Sample Space: $\{1, 2, 3, 4, 5, 6\}$ "Collection" of all possible outcomes

Events: $A = \{1, 3, 5\}$ ✓ Dice showing odd nos. Any subset of Sample Space is an event

$B = \{2, 4, 6\}$ ✓ Dice is showing even nos.

$C = \{1, 2, 3, 4\}$ ✓ less than 5, at most 4 ($1 \leq 4$), Not more than 4

$D = \{1, 2, 3, 7\}$ ✗ Not in SS

Experiment

Outcomes

Sample Space

Events

Coin Toss

Outcomes : $\{H\}, \{T\}$

SS : $\{H, T\}$ N

$$2^N = 2^2 = 4$$

$\{H\}, \{T\}, \{H, T\}, \{\}$

Events :

- $A = \{H\}$ ✓ ← "Obtaining H", "Not Tails"
- $B = \{T\}$ ✓ ← "Obtaining T", "Not Heads"
- $C = \{H, T\}$ ✓ ← "either H or T"
- $D = \{\}$ ✓ \emptyset Empty Set / NULL SET ← "Neither H nor T"

probability of Event A is

$$\Rightarrow \frac{\# \text{ elements in Set A}}{\# \text{ element in } \textcircled{SS} \leftarrow \begin{matrix} \text{Universal} \\ \text{Set} \end{matrix}}$$

Experiment

Outcomes

Sample Space

Events

Tossing 2 Coins

Simultaneously

Outcomes:

$\{H^1 H^2\}, \{H T\}, \{T H\}, \{T T\}$

Sample Space: $\{HH, HT, TH, TT\}$

Event: $A = \{HH, HT, TH\}$ ✓

either is head

at most 1 tail (≤ 1)

at least 1 head (≥ 1)

No TT

$B = \{HH, TT\}$ ✓

→ Both are Same

H/T
○
L

H/T
○
R

H T
L R

~~T~~ ~~H~~
L R

SS : { HH, HT, TH, TT }

$$2^4 = \boxed{16}$$

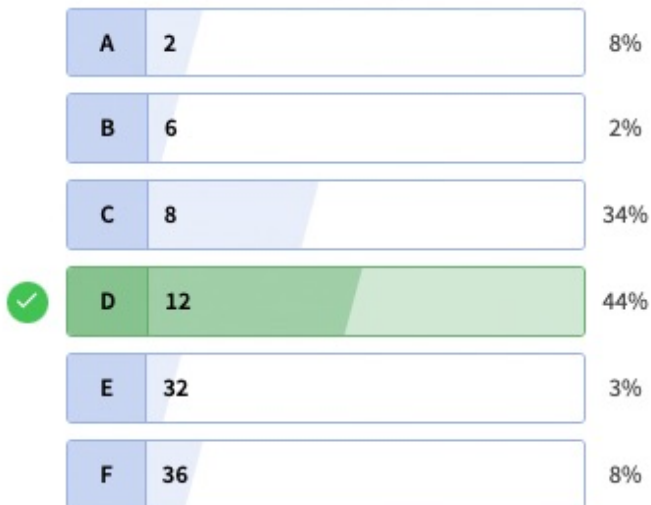
- (1) { HH }
- (2) { HT }
- (3) { TH }
- (4) { TT }
- (5) { HH, HT }
- (6) { HT, TH }
- (7) { TH, TT }
- (8) { HH, TT }
- (9) { HT, TT }
- (10) { HH, TH }
- (11) { HH, HT, TH }
- (12) { HH, HT, TT }
- (13) { HT, TH, TT }
- (14) { HH, TT, TH }
- (15) { HH, HT, TH, TT }
- (16) { }

Quiz time!

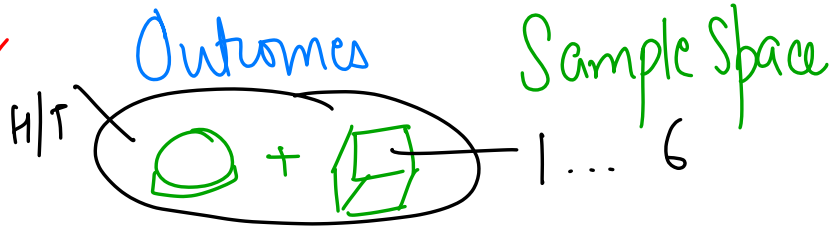
 Quiz Ended!

We are tossing a coin followed by a dice. How many elements will be there in the sample space?

59 users have participated



Experiment
Tossing a coin
followed by
a dice



Events

Outcomes -

$\{H1\}$ $\{H2\}$ $\{H3\}$ $\{H4\}$... $\{H6\}$
 $\{T1\}$ $\{T2\}$ $\{T3\}$. . . $\{T6\}$

Sample

$\{H1, H2, \dots, H6, T1, T2, \dots, T6\}$

(12)

Event:

$\{H1, H3, H5\}$

Head & odd No.s

Head & No even No.s

Notail & odd No.s

Notail & No even No.s

2^{12}

Experiment
Dice Roll

Outcomes
 $\{1\}, \{2\}, \{3\}, \{4\}, \{5\}, \{6\}$

Sample Space
 $\{1, 2, 3, 4, 5, 6\}$
Universal Set

Events

A : $\{1, 3, 5\}$

B : $\{1, 5, 6\}$

C : $\{2, 4, 6\}$

Intersection

$A \cap B : \{1, 5\}$ "members belonging to both A AND B"

Union

$A \cup B : \{1, 3, 5, 6\}$ "members belonging to either A OR B"

Compliment

$A^c / A' = \{2, 4, 6\}$ "members belonging to Universal set which are NOT IN A"

$B^c / B' = \{2, 3, 4\}$

$C^c / C' = \{1, 3, 5\}$

$$A^c = U - A$$

$$= \{1, 2, 3, 4, 5, 6\} - \{1, 3, 5\}$$

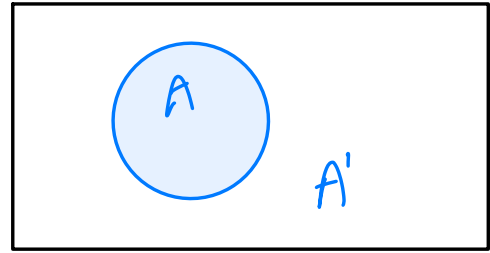
$$A^c = \{2, 4, 6\}$$

$$A \cup A' = U$$

$$A \cap A' = \{\} \neq \emptyset$$

$$A \cap C = \emptyset$$

\Rightarrow Mutually Exclusive Events
Disjoint Sets

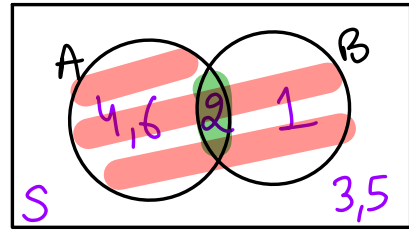


$$A = \{2, 4, 6\}$$

$$B = \{1, 2\}$$

$$P(A) = \frac{\#\{2, 4, 6\}}{\#\{1, \dots, 6\}} = \frac{3}{6}$$

$$P(B) = \frac{\#\{1, 2\}}{\#\{1, \dots, 6\}} = \frac{2}{6}$$



$$P(A \cap B) = \frac{\#\{2\}}{\#\{1, \dots, 6\}} = \frac{1}{6}$$

$$P(A \cup B) = \frac{\#\{1, 2, 4, 6\}}{\#\{1, \dots, 6\}} = \frac{4}{6}$$

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

$$\{1, 2, 4, 6\} \quad \{2, 4, 6\} + \{1, 2\} - \{2\}$$

Quiz time!

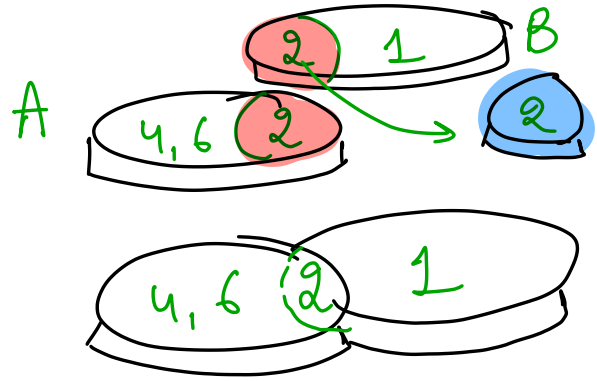
⌚ TIME LEFT: 36 Secs

We are tossing a dice, where the sample space is $\{1, 2, 3, 4, 5, 6\}$
Which of following is not an event?

51 users have participated

- | | | |
|-----|------------------|------|
| A | $\{1\}$ | 0% |
| B | $\{1, 3\}$ | 0% |
| C | $\{1, 3, 5\}$ | 0% |
| ✓ D | $\{1, 3, 5, 7\}$ | 100% |

[End Quiz Now](#)



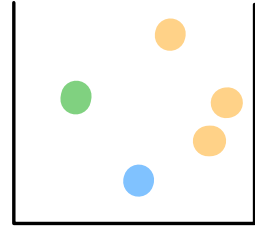
Quiz time!

🕒 Quiz Ended!

There are 4 green balls, 6 yellow balls, and 2 blue balls in a bag. A random ball is chosen. Find the probability that a yellow or blue ball is chosen

60 users have participated

A	4/12	3%
B	6/12	5%
✓ C	8/12	83%
D	10/12	8%



Total = 12

$$P(Y \cup B) = \frac{\# \{ \text{blue, yellow, yellow, yellow, yellow, yellow, green} \}}{\# \{ \text{blue, blue, yellow, yellow, yellow, yellow, green} \}} = \frac{8}{12}$$

Quiz time!

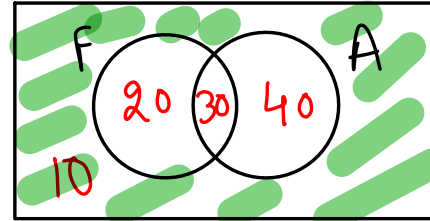
🕒 Quiz Ended!

It is known that 70% people use Amazon, 50% use Flipkart. 30% people use both.
What percentage of people use neither Amazon, nor Flipkart?

56 users have participated



A	10	55%
B	20	25%
C	30	13%
D	40	7%



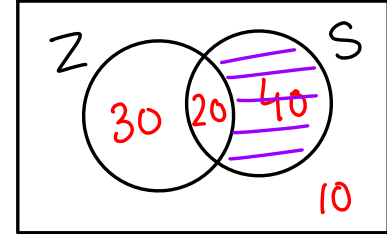
Quiz time!

🕒 Quiz Ended!

It is known that 60% people use Swiggy, 50% use Zomato. 20% people use both.
What percentage use Swiggy, but do not use Zomato?

61 users have participated

A	60%	10%
B	50%	11%
✓ C	40%	67%
D	20%	11%



Quiz time!

⌚ TIME LEFT: 40 Secs

It is known that 80% people like cappuccino, 40% people like espresso, and 30% like both. What percentage of the people like cappuccino, but do not like espresso?

56 users have participated



A

50%

88%

B

40%

4%

C

30%

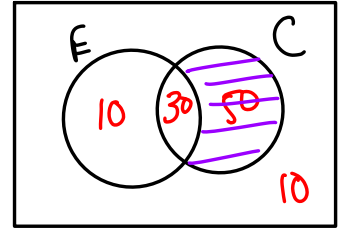
5%

D

80%

4%

[End Quiz Now](#)



Quiz time!

⌚ TIME LEFT: 52 Secs

Which of the following represent mutually exclusive sets? ✓

✓ 55 users have participated ✓ X



A Youtube premium Vs Non-premium users 95% ✓

B People who like Cappuccino Vs Espresso 2% ✓

C Users of Swiggy Vs Zomato 2% ✓

D Users of Amazon Vs Flipkart 2% ✓

[End Quiz Now](#)

$$\begin{matrix} \downarrow & \downarrow \\ A & \cap & C = \emptyset \end{matrix}$$

Quiz time!

🕒 Quiz Ended!

In an NPS survey, it is seen that 90% are either promoters or neutral. 30% percent are neutral or detractor. What percent of people are neutral?

47 users have participated

A	10%	15%
✓ B	20%	40%
C	30%	38%
D	70%	6%

