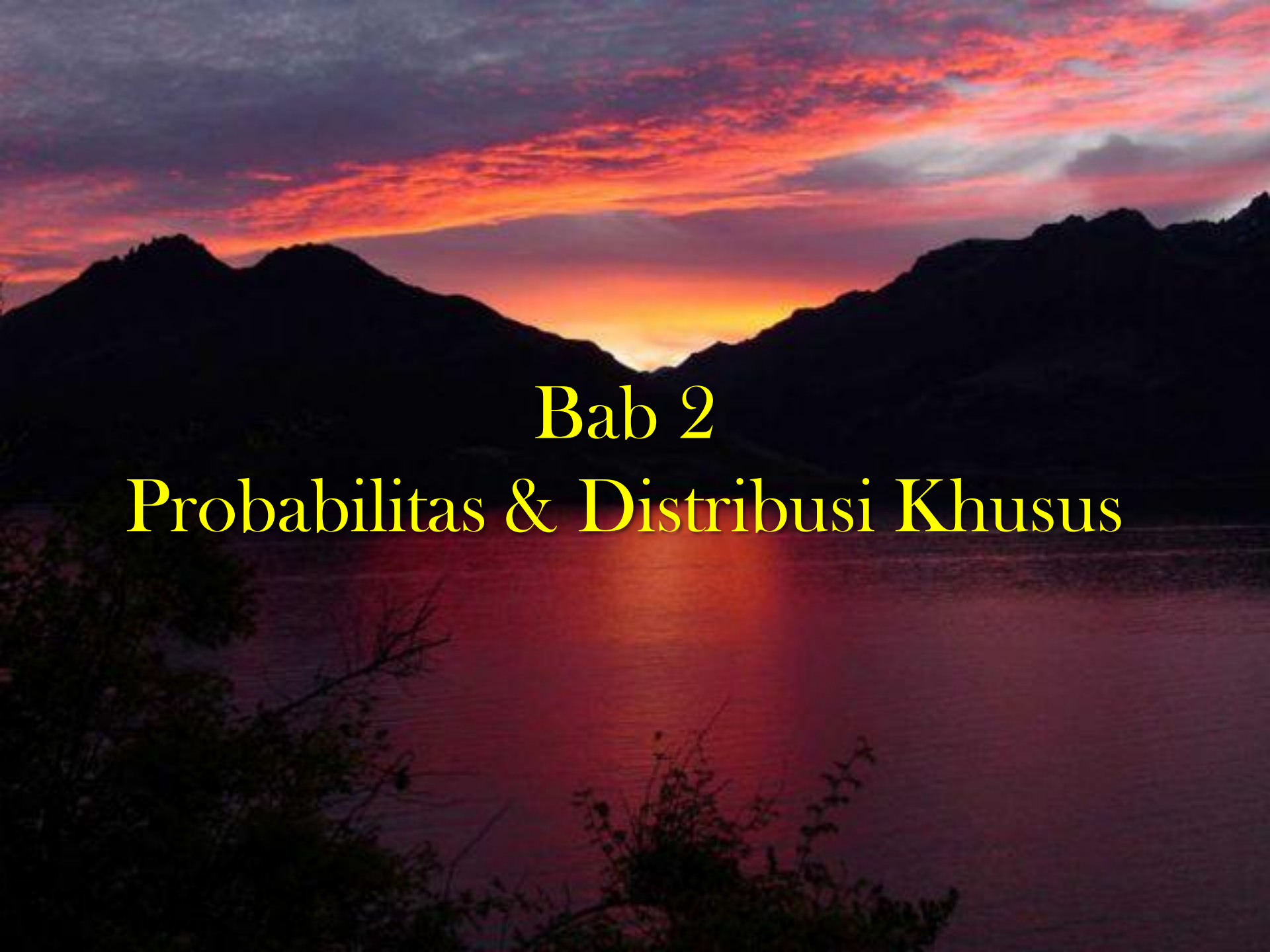
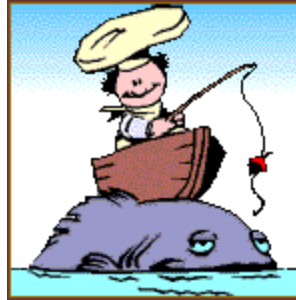


A scenic landscape at sunset or sunrise. The sky is filled with vibrant orange, red, and pink clouds. The sun is low on the horizon, casting a bright glow. In the foreground, there are dark, silhouetted mountains and a body of water reflecting the sky's colors. The overall mood is serene and beautiful.

Bab 2

Probabilitas & Distribusi Khusus

Hidup penuh dengan ketidakpastian..



- ❑ Tidak mungkin kita bisa PASTI mengetahui kejadian yang akan datang
- ❑ Probabilitas → prediksi masa y.a.d → Membantu untuk memberikan suatu keputusan

Probabilitas...



- The probability of any outcome of a random phenomenon is the proportion of times the outcome would occur in a very long series of repetitions.
- List the outcomes of a random experiment...

General way to say

Probability of event A occurring $\rightarrow$
$$P(A) = \frac{n(A)}{n(S)}$$

Number of ways of getting an event A

The number of possible outcomes

Pendekatan Klasik...

Jika suatu eksperimen mempunyai n kemungkinan kejadian maka peristiwa ini memberikan probabilitas $1/n$ pada tiap kejadian.

Contoh 1

Eksperimen: pelemparan satu dadu

Ruang Sampel, $S = \{1, 2, 3, 4, 5, 6\}$

Probabilitas : Tiap titik sampel mempunyai kemungkinan $1/6$ terjadi

Kejadian *Equally Likely*

Probabilities under equally likely outcome case is simply the number of outcomes making up the event, divided by the number of outcomes in S.

Contoh 2

A = kejadian pelemparan dadu , $A=\{2, 4, 6\}$,
jadi

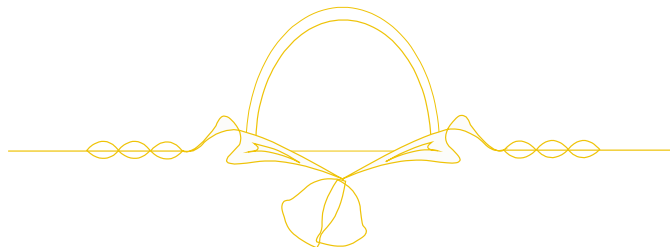
$$P(A) = 3/ 6 = 1/2 = .5$$

Contoh 3

Pelemparan koin, $A=\{H\}$, $P(A) = 1/2= 0.5$

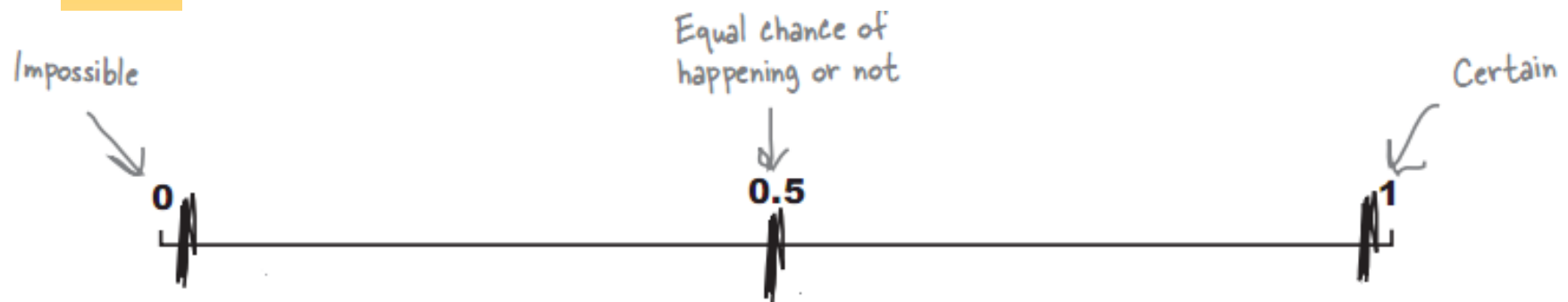
Ruang sampel ...

- Adalah himpunan semua kemungkinan kejadian, notasi : S
- **Contoh 4**
Pelembaran dadu: $S=\{1, 2, 3, 4, 5, 6\}$
Pelembaran koin: $S=\{HH, TT, HT, TH\}$
- Kejadian individual dari ruang sampel disebut dengan kejadian sederhana (simple event)
 - Diskrit $\Rightarrow$ anggota berhingga
 - Kontinu $\Rightarrow$ interval



Kejadian

→ Adalah kumpulan satu atau lebih kejadian sederhana dalam ruang sampel



Contoh 5

Pelemparan : $S = \{1, 2, 3, 4, 5, 6\}$

Kejadian : muncul mata dadu jumlah genap



Ruang Sampel Diskrit..

Contoh 6

- Eksperimen : Pelemparan satu dadu
- Ruang Sampel, $S = \{1,2,3,4,5,6\}$
- Kejadian:
 $A = \text{Bilangan ganjil} = \{1,3,5\}$
 $B = \text{Bilangan genap} = \{2,4,6\}$

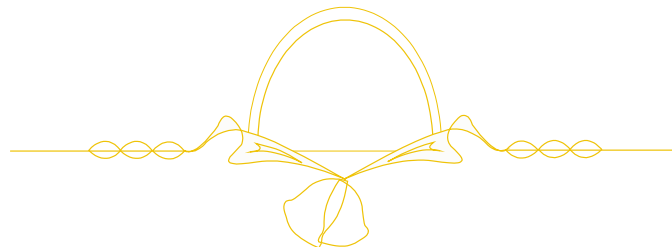
Contoh 7

- Eksperimen : Pelemparan dua koin
- $S = \{MM, MB, BM, BB\}$
- Kejadian :
 $A = \text{dua sisi sama} = \{MM, BB\}$
 $B = \text{paling tidak 1 M} = \{MM, MB, BM\}$

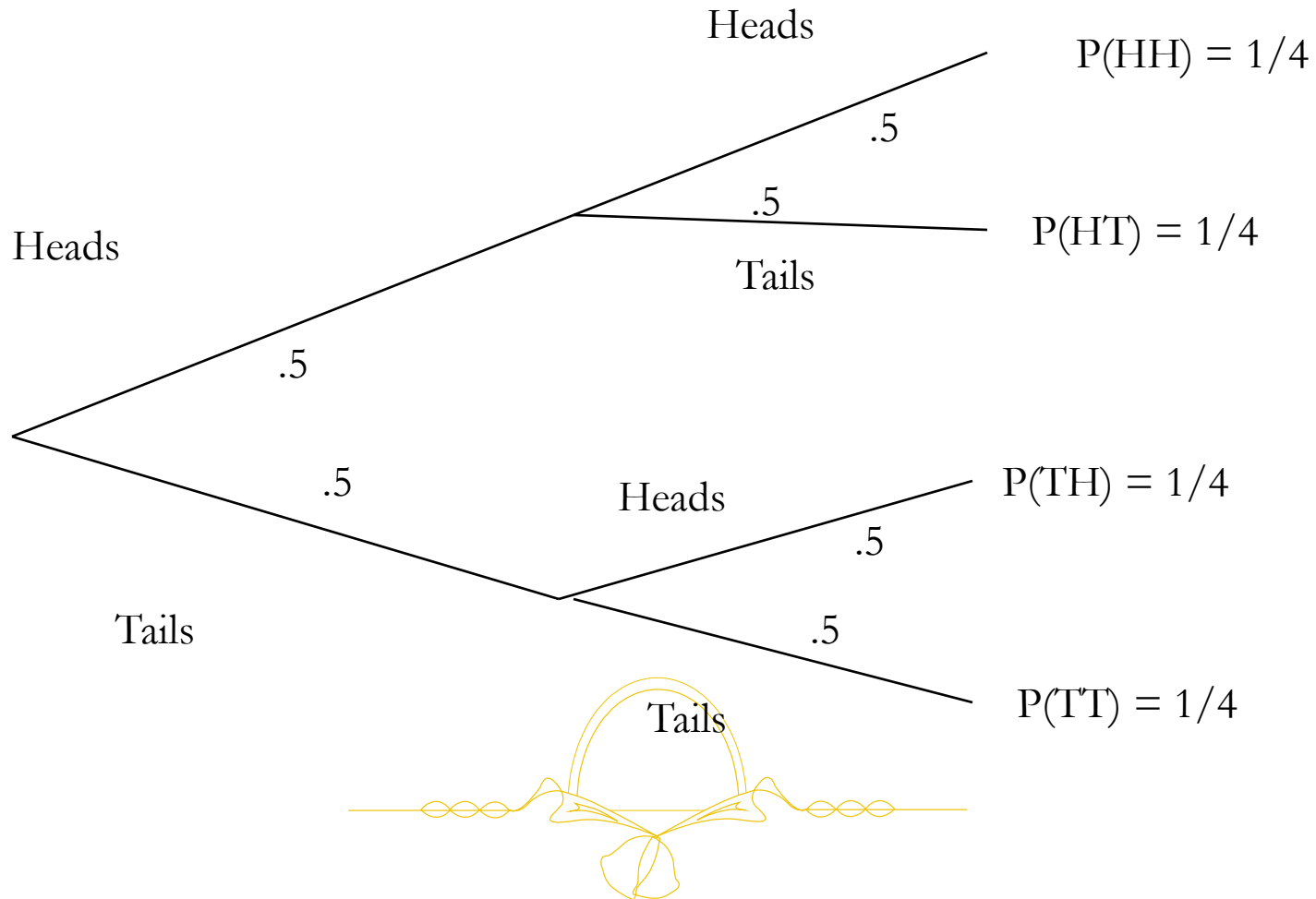
Ruang Sampel Kontinu...

Contoh 8

- Eksperimen : Data IPK mahasiswa
- Peristiwa : bilangan riil antara 0 dan 4
- $S = \{x \in \mathbb{R} : 0 \leq x \leq 4\}$
- Kejadian :
 - $A = \text{IPK lebih dari 3} = \{3 < x \leq 4\}$
 - $B = \text{IPK dibawah 2} = \{0 \leq x < 2\}$



Contoh 9 Pohon Probabilitas : Pelemparan satu koin



Exhaustive & Mutually Exclusive

- Suatu kejadian ***exhaustive***, jika semua hasil suatu eksperimen termasuk

Ex10:

Die roll ~~{1,2,3,4,5}~~ $\longrightarrow$ Die roll {1,2,3,4,5,6}

- Suatu kejadian ***mutually exclusive*** jika dua hasil eksperimen tidak bisa terjadi pada waktu yang sama

Ex11 :

Die roll ~~{ number less than 4 or even number }~~

Die roll {odd number or even number}

Diagram Venn

Hubungan antara kejadian dengan ruang sampel dapat digambarkan dalam suatu diagram venn

Kejadian komplemen $A' / A^c / \bar{A}$

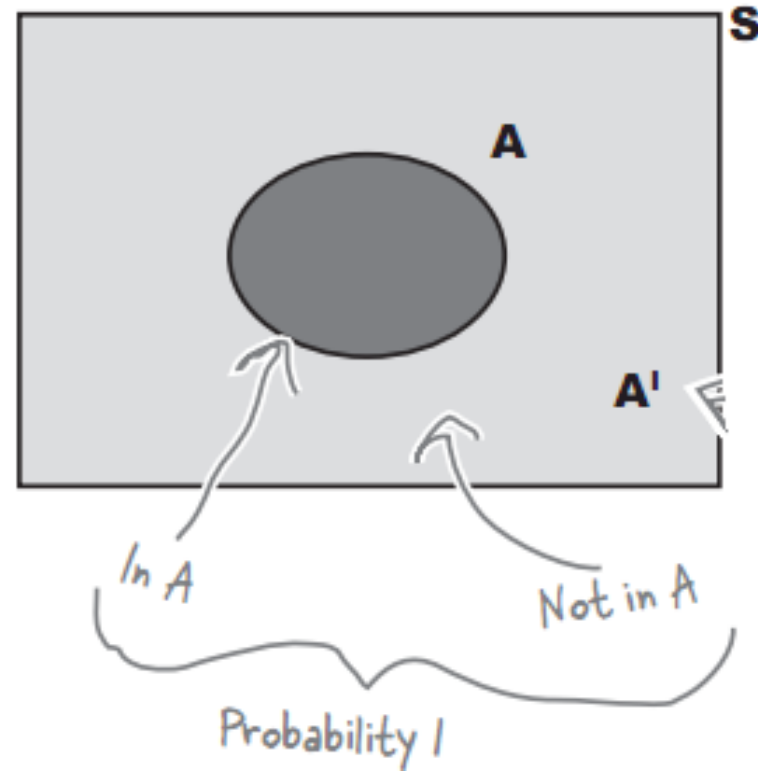
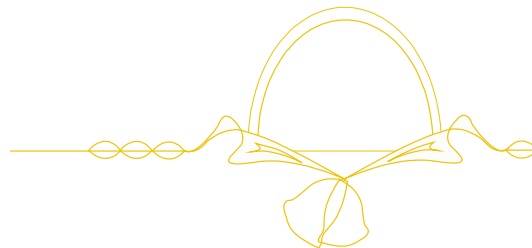
→ Mengindikasikan kejadian A tidak terjadi

Example 12

S : Bilangan Asli

A : Bilangan Ganjil

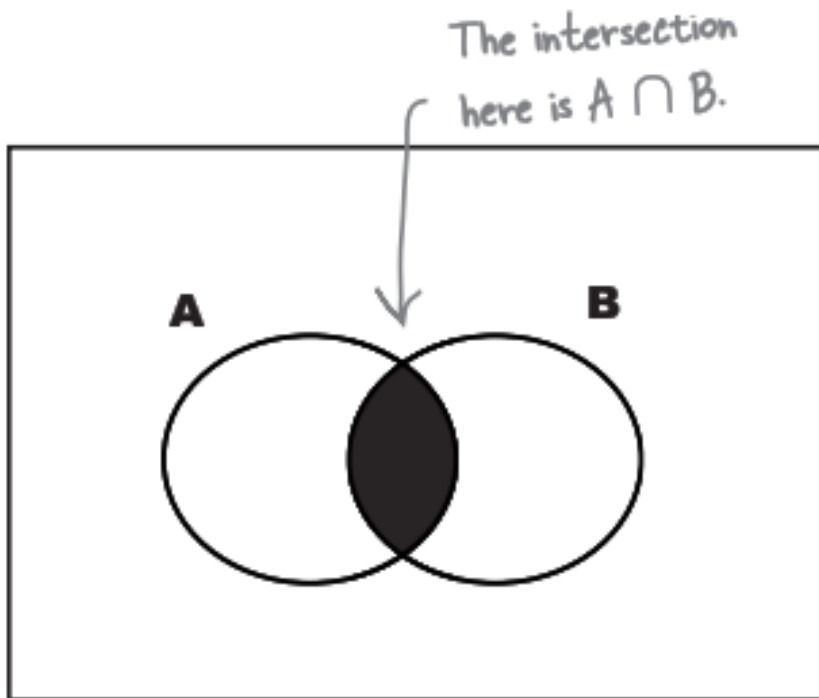
A' : Bilangan Genap



Irisan

- **Irisan antara kejadian A dan B adalah kejadian yang terdiri dari perpotongan kejadian A dan B**

“A and B” : $A \cap B = \{\omega \in \Omega \mid \omega \in A \text{ dan } \omega \in B\}$



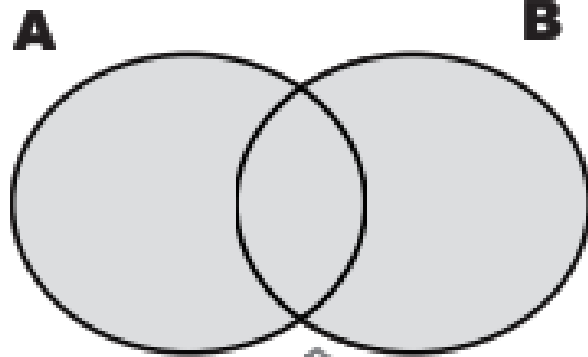
S



Gabungan

- Gabungan dua kejadian A dan B, dinotasikan $A \cup B$
→ Kejadian yang terdiri dari kejadian A atau B atau keduanya

“A atau B” : $A \cup B = \{\omega \in \Omega \mid \omega \in A \text{ atau } \omega \in B\}$

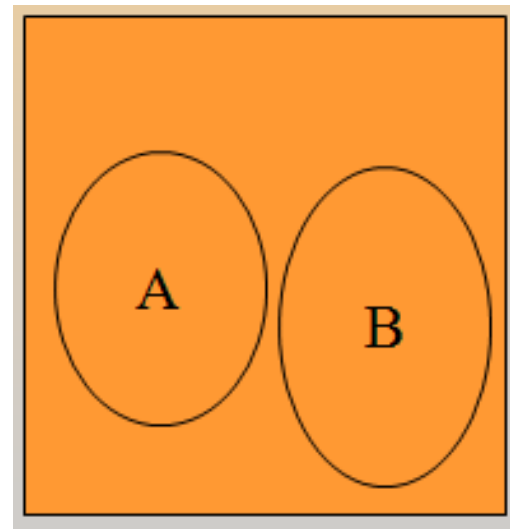


S
If there are no elements that aren't in either A, B, or both, like in this diagram, then A and B are exhaustive. Here the white bit is empty.

The entire shaded area is $A \cup B$.

Kejadian Mutually Exclusive

- Dua kejadian A dan B mutually exclusive jika keduanya tidak mempunyai irisan atau $A \cap B = \emptyset$



Watch it!

**There's a difference
between exclusive
and exhaustive.**

*If events A and B are
exclusive, then*

$$P(A \cap B) = 0$$

If events A and B are exhaustive, then

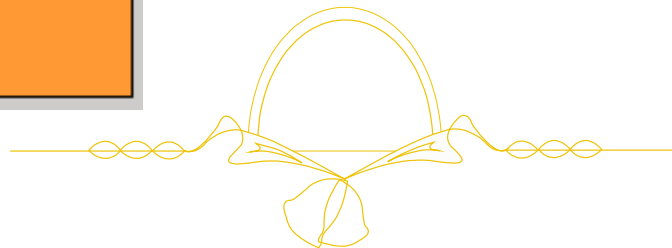
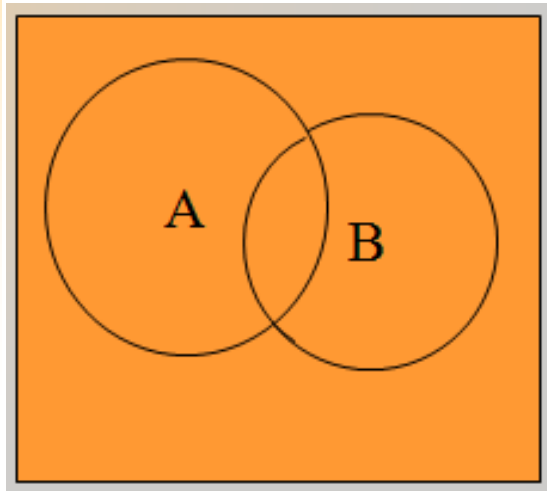
$$P(A \cup B) = 1$$



Kejadian NonMutually Exclusive

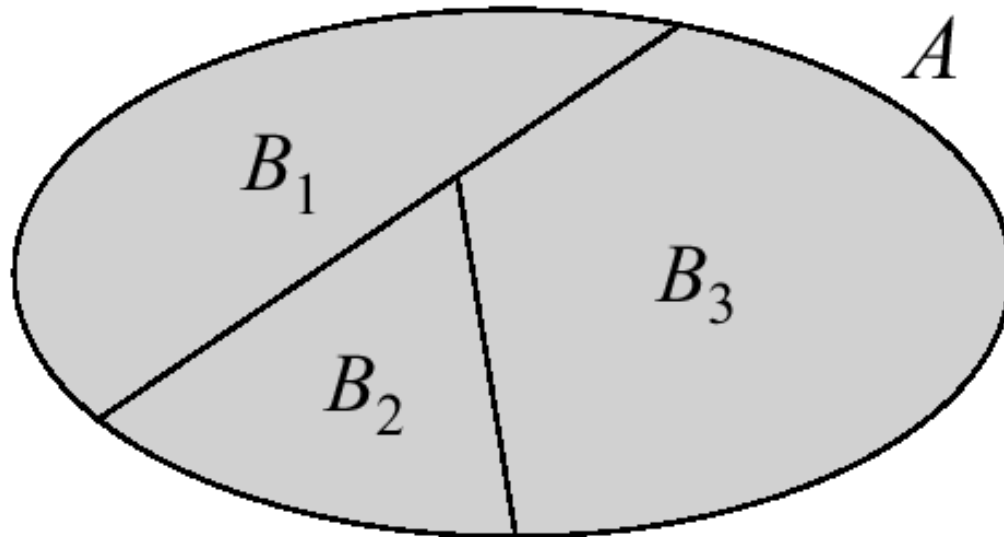
- If an events A and B have intersection, we can say that

$$A \cap B \neq \emptyset$$



Partisi kejadian

- Jika terdapat kumpulan kejadian $\{B_1, B_2, \dots\}$ maka partisi kejadian A memenuhi :
 - (i) $B_i \cap B_j = \emptyset$, untuk setiap $i \neq j$
 - (ii) $\cup B_i = A$



For a discrete sample space, the *probability of an event* E , denoted as $P(E)$, equals the sum of the probabilities of the outcomes in E .

Sifat-sifat probabilitas ...

- (i) $0 \leq P(A) \leq 1$
- (ii) $P(\emptyset) = 0$
- (iii) $P(\Omega) = 1$
- (iv) $P(A^c) = 1 - P(A)$
- (v) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- (vi) A and B are disjoint $\Rightarrow P(A \cup B) = P(A) + P(B)$
- (vii) $\{B_i\}$ is a partition of $A \Rightarrow P(A) = \sum_i P(B_i)$
- (viii) $A \subset B \Rightarrow P(A) \leq P(B)$

Kejadian dan Probabilitas

- The *probability of an event* is the **sum** of the probabilities of the simple events that constitute the event.

Contoh 13

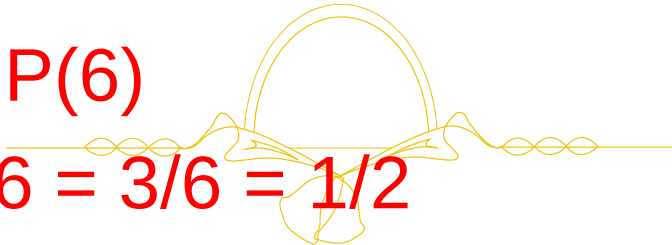
(Pelemparan 1 dadu bermata 6) $S = \{1, 2, 3, 4, 5, 6\}$
dan

$$P(1) = P(2) = P(3) = P(4) = P(5) = P(6) = 1/6$$

maka:

$$P(\text{Genap})$$

$$= P(2) + P(4) + P(6)$$

$$= 1/6 + 1/6 + 1/6 = 3/6 = 1/2$$




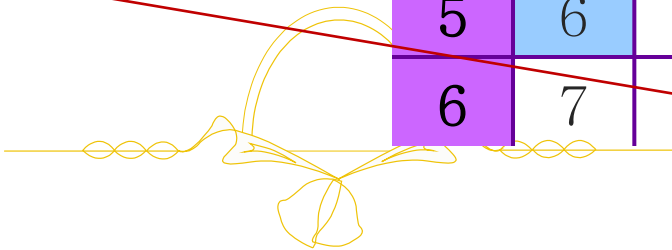
Contoh 14

- Pelemparan dua dadu bermata 6
- $S = \{2, 3, \dots, 12\}$

$$P(2) = 1/36$$

$$P(7) = 6/36$$

$$P(10) = 3/36$$



	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

Red arrows indicate the following cells: (1,2), (2,6), (3,6), (4,10), (5,10), and (6,10).