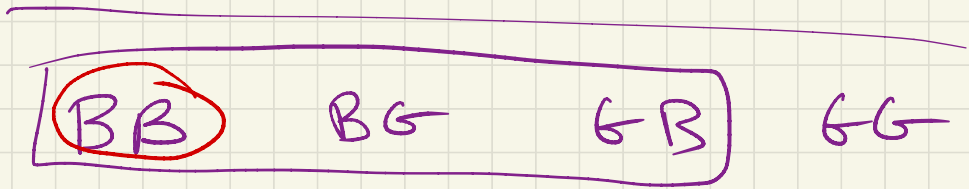
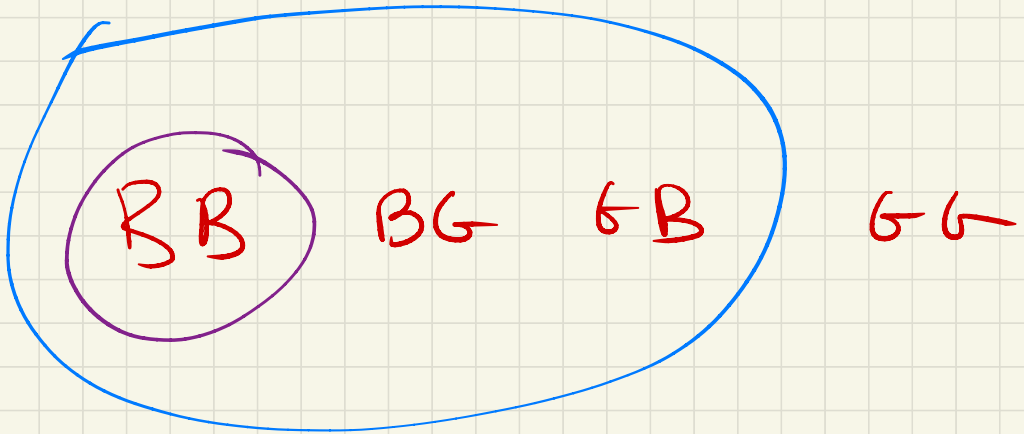


50%



$\frac{1}{3}$

Conditional Probability



$P(\text{at least one child is a boy AND the other is a boy})$

$P(\text{At least one child is a boy})$

$$\frac{\frac{1}{4}}{3} = \frac{1}{3}$$

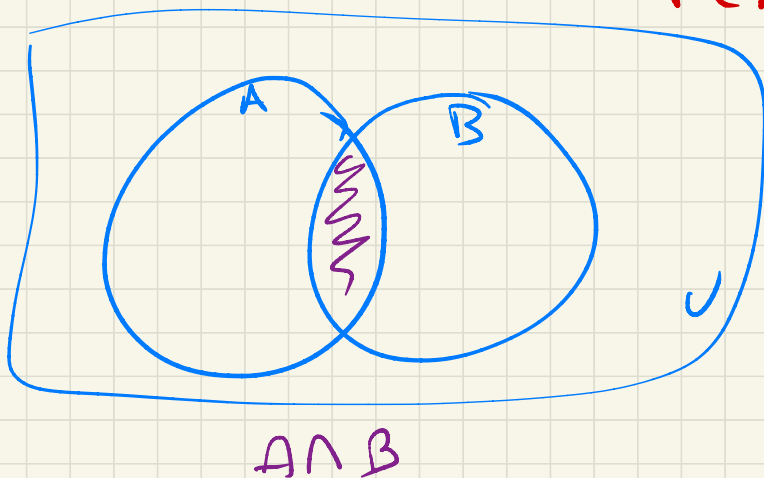
$$P(B | A)$$

↑
given

"probability of B, given A"

intersection
↓

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



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

Sum of the
dice is 20

at least
one die is
showing a 4

$P(A^c)$

$$P(A) = 1 - P(A^c)$$

No dice has a 4

$$1 - \frac{5 \cdot 5}{6 \cdot 6}$$

$$\frac{36}{36}$$

$$= 1$$

$$- \frac{25}{36} = \frac{36-25}{36}$$

$$= \frac{11}{36}$$

	1	2	3	5	6
1	11	12	13	15	16
2	21				
3	23				
5	25				
6	26				

25

$$P(B \cap A) = \frac{2}{36}$$

$$\left. \begin{matrix} 4, 6 \\ 6, 4 \end{matrix} \right\} \frac{2}{36}$$

$$P(B|A) = \frac{\frac{2}{36}}{\frac{11}{36}} = \boxed{\frac{2}{11}}$$

$P(B \mid A)$
 Sum is 7
 Any of indices showing odd

$$P(A) = 1 - \bar{P}(A)$$

$$1 - \frac{9}{36}$$

$$= \frac{27}{36}$$

No odd is showing
 = All Even

$$\begin{array}{ccc} & 2 & 4 & 6 \\ 2 & 2, 4, 6 & & \\ 4 & & 2, 4 & \\ 6 & & & 2, 4, 6 \end{array}$$

$$P(B \cap A)$$

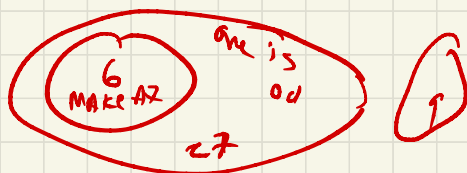
$$= \frac{6}{36}$$

$$\frac{P(B \cap A)}{P(A)} = \frac{\frac{6}{36}}{\frac{27}{36}}$$

$$= \frac{6}{27}$$

1 6
 2 5
 3 4
 4 3
 5 2
 6 1

$$\frac{6}{36}$$



$$P(B|A)$$

Sum is less
than 6

values both
even

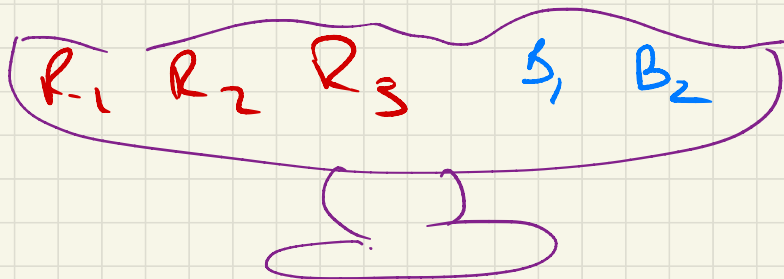
$$P(A) = \frac{9}{36}$$

$$P(B \cap A) = \frac{3}{36}$$

	2	4	6
2	2,2	2,4	2,6
4	4,2	4,4	4,6
6	6,2	6,4	6,6

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

$$= \frac{\frac{3}{36}}{\frac{9}{36}} = \frac{3}{9} = \frac{1}{3}$$



$$\binom{5}{2} = 10$$

$$\binom{3}{2} = 3$$

$$\boxed{\frac{3}{10}}$$

$R_1 B_1$ $R_2 B_1$...
 $R_1 B_2$ $R_2 B_2$...
 $R_1 R_2$ $R_2 R_3$...
 $R_1 R_3$

$R_1 R_2$ $R_2 R_3$
 $R_1 R_3$

Draw 2 out
both red

$P(B | A)$
 the other ball is blue
 At least one is red

$$P(A) = 1 - \bar{P}(A)$$

non or red

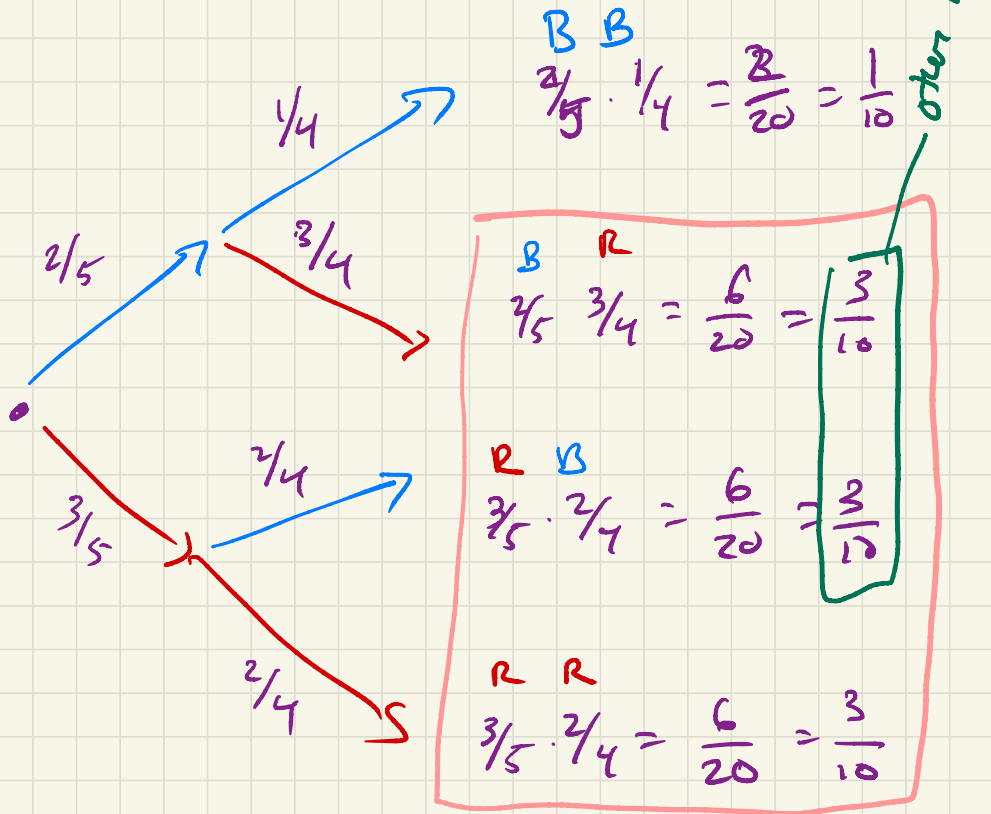
$$= 1 - \frac{1}{10}$$

At least one red

$$P(A \cap B) = \frac{6}{10}$$

$$P(B | A) = \frac{P(A \cap B)}{P(A)} = \frac{\frac{6}{10}}{\frac{9}{10}} = \frac{6}{9} = \frac{2}{3}$$

$$P(\text{other Blue} \mid \text{At least one red}) = \frac{6}{9} = \frac{2}{3}$$



$$P(BR) + P(RB)$$

$$\frac{3}{10} + \frac{3}{10} = \frac{6}{10}$$

At least
one
Red