HW:

#58. Full House.

① 3 of a kind and a pair. ②

$$\frac{13 \cdot {}_4C_3}{{}_{52}C_3}$$

Ex let's assume ② happens on its own.

$$\frac{13 \cdot {}_4C_2}{{}_{52}C_2}$$

Let's combine them. (① and ②) are dependent events.

$$\frac{13 \cdot {}_4C_3}{{}_{52}C_3} \cdot \frac{12 \cdot {}_4C_2}{{}_{49}C_2} \approx$$

$${}_nC_k = \binom{n}{k} = \frac{n!}{k!(n-k)!}$$

→ 0.1441?

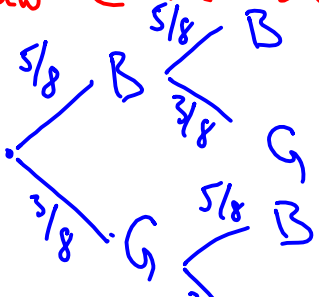
Ex

$$\frac{52 \cdot 3 \cdot 2 \cdot 48 \quad 3}{5! \cdot {}_{52}C_5}$$

2 events (Dependence vs. Independence)

Ex 8 marbles in a bag 3G, 5B
Draw marbles w/replacement.

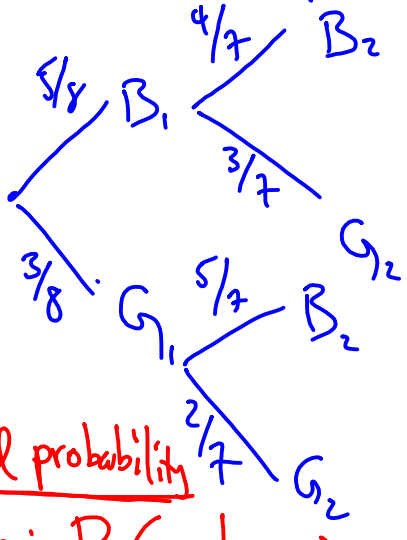
Ex Draw 2 marbles



The 2 draws are independent

$P(B \cap B) = P(B) \cdot P(B) = \frac{5}{8} \cdot \frac{5}{8}$

Ex Same situation w/no replacement. 5B, 3G

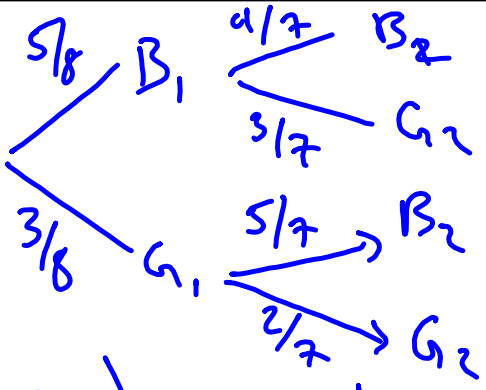


Draw 1 and Draw 2 are dependent.

Conditional probability

notation: $P(B_2 \mid G_1)$ → probability of B_2 given you know G_1 happened.

Some ex



$P(B_2 | G_1) = 5/7$ | however. $P(G_1 \cap B_2) = 15/56$

$P(B_2 | B_1) = 4/7$ | however $P(B_2 \cap B_1) = 20/56$.

	Chem	Phy	Bio	Totals
French	7	4	3	14
Spanish	1	6	9	16
Totals	8	10	12	30

Randomly choose a student

$P(C) = 8/30$ $P(C|F) = 7/14 = \frac{1}{2}$

$P(F|C) = 7/8$

more generally.

$$P(A \cap B) = P(A|B) \cdot P(B)$$

mathematical def..

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

2 dice are rolled:

$A = \{$both are the same$\}$

$B = \{$they sum to 6$\}$.

Show A and B are not independent

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

$P(A) = \frac{6}{36} = \frac{1}{6}$ $P(B) = \frac{5}{36}$

$P(A \cap B) = \frac{1}{36}$

$P(A) \cdot P(B) \neq P(A \cap B)$.

thus A and B are not independent.

the other way to look at this

$P(A|B) = \frac{1}{5} \neq P(A) = \frac{1}{6}$

thus A and B are dependent.