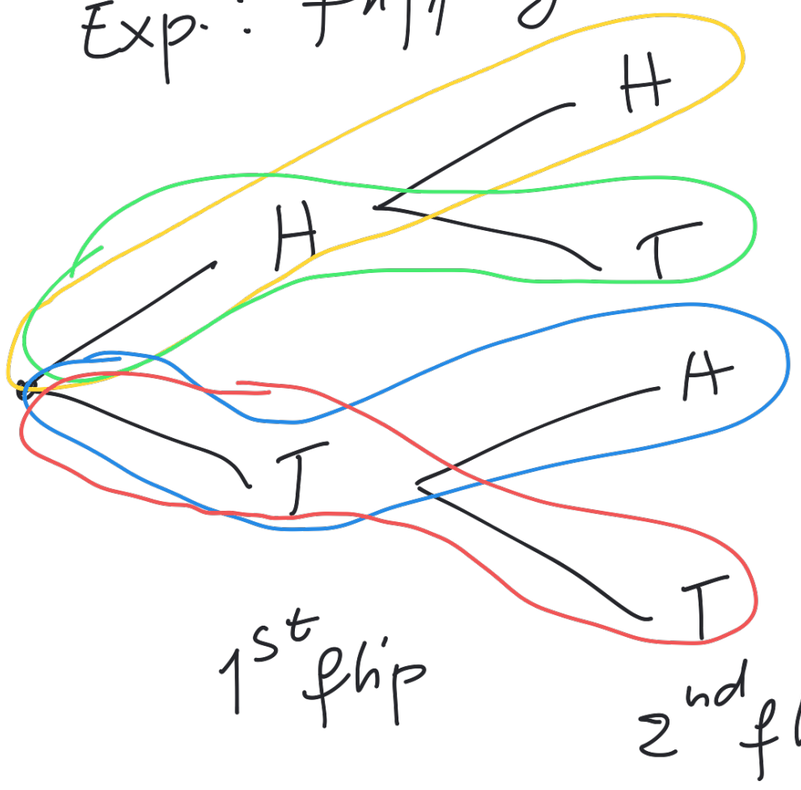
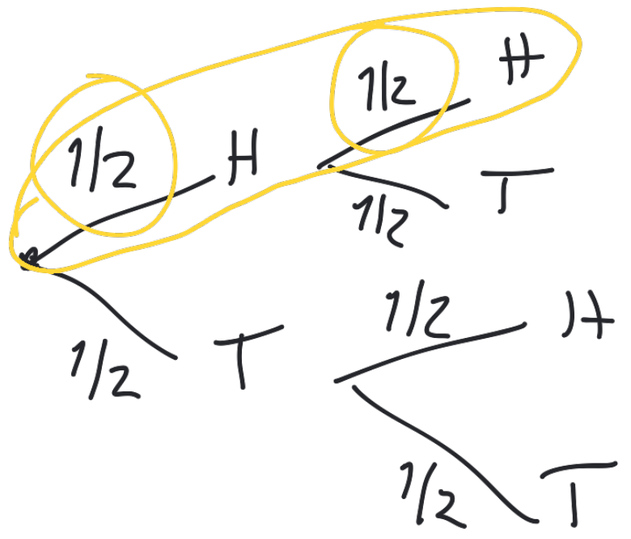
Lecture 4

① Exp.: flipping a coin 2 times



$\Omega = S = \{(H,H),(H,T),(T,H),(T,T)\}$



$P((H,H)) = P((H,T)) = P((T,H)) = P((T,T)) = \frac{1}{4}$

$P((H,H)) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

$\Rightarrow$ Exp. is fair

(2) Exp.: Rolling 6-sided fair die 2 times

$E \equiv$ obs. 1 or 2 in either roll

either

1st Roll \ 2nd Roll	1	2	3	4	5	6
1	(1,1)	(1,2)				
2	(2,1)	(2,2)				
3						
4						
5						
6						

(3,4) (4,4) (5,5) (6,6)

$\Omega \equiv$ {contains all pairs of possible rolls}

$|\Omega| = 36$

$E = \{(1,1),(1,2),(2,1),(2,2)\}$

$E \subset \Omega$

$$P(E) = \frac{|E|}{|\Omega|} = \frac{4}{36}$$

(3) $\Omega \equiv$ {contains all pairs of rolls}, $|\Omega| = 36$

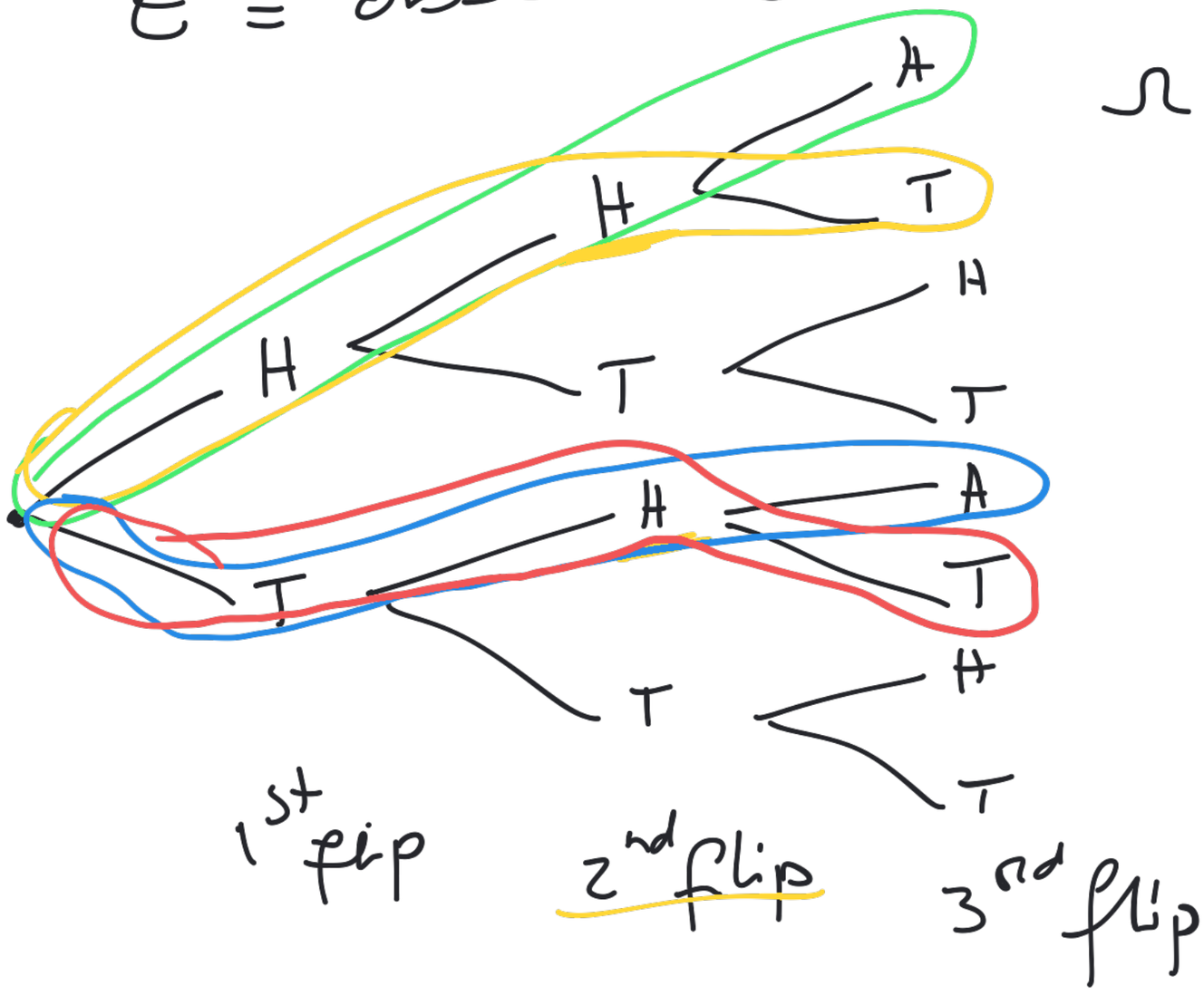
$E \equiv$ {at least one roll is a 4}

$P(E) = \frac{11}{36}$,

$E = \{(1,4), (2,4), (3,4), (4,4), (5,4), (6,4), (4,1), (4,2), (4,3), (4,5), (4,6)\}$

④ Exp. ≡ flip a coin 3 times

E ≡ observing heads in 2nd flip



$\Omega = \{(H,H,H),(H,H,T),$
$(H,T,H),(H,T,T),$
$(T,H,H),(T,H,T),$
$(T,T,H),(T,T,T)\}$

$E = \{(H,H,H),(H,H,T),$
$(T,H,H),(T,H,T)\}$

$P(E) = \frac{4}{8} = \frac{1}{2}$

(5) Exp.: flip fair coin 3 times

Sub-Exp.: counting # heads in Exp.

E = it came up heads 2 times

$$\Omega = \{(H,H,H),(H,H,T),\ldots,(T,T,T)\},\ |\Omega| = 8$$

$$S = \{0,1,2,3\}$$

$$E = \{(H,H,T),(H,T,H),(T,H,H)\}$$

$$p(E) = \frac{3}{8} = \frac{|E|}{|\Omega|}$$