⑤

$$P(R) = \frac{7}{30} \approx .2333$$

$$P(Y) = \frac{4}{30} \approx .1333$$

$$P(O) = \frac{5}{30} \approx .1667$$

$$P(G) = \frac{8}{30} \approx .2667$$

$$P(B) = \frac{6}{30} \approx .2000$$

Prob (1 of every color)

$$= \frac{7}{30} \cdot \frac{4}{29} \cdot \frac{5}{28} \cdot \frac{8}{27} \cdot \frac{6}{26} \approx$$

$$= (7 \cdot 4 \cdot 5 \cdot 8 \cdot 6) / (30 \cdot 29 \cdot 28 \cdot 27 \cdot 26)$$

$$\approx .0003929 \approx .0004$$

What if she chose one of each color

(4)

25 Ninjas
9 Missions
6 Jutsus
40 cards

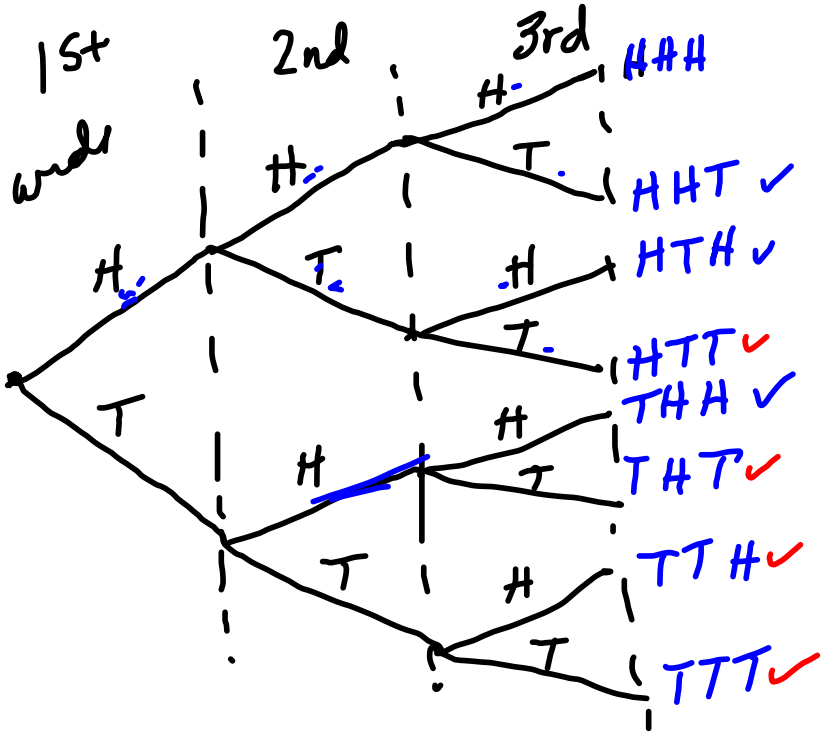
$$P(\text{3 consecutive jutsus}) = \frac{6}{40} \cdot \frac{5}{39} \cdot \frac{4}{38}$$

$$\approx .0020$$

.998 Probably would not believe it

Second Sheets

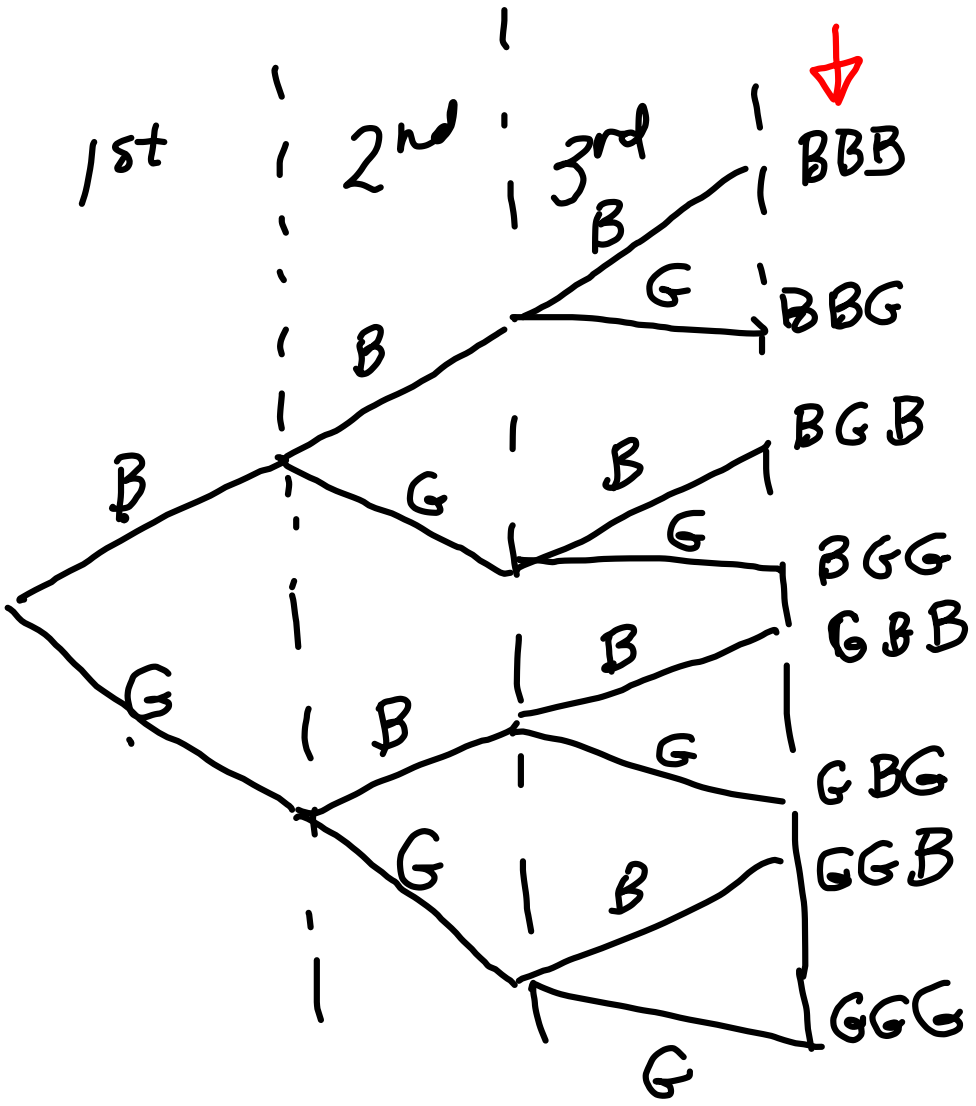
#2



a) $P(\text{one Tail}) = \frac{3}{8}$

b) $P(2 \text{ or } 3 \text{ tails}) = \frac{4}{8} = \frac{1}{2}$

c) $p(\text{no heads}) = \frac{1}{8}$



$P(3\text{ Boys}) = \frac{1}{8}$

$$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{8}$$

My game

Roll a die	toss a coin	Roll a die
6	2	6

total possible outcomes

72

4.4 Marginal & Conditional Probabilities

4.54

cell - each box that contains a number

	Yes	No	Total
Boys	201	129	330
Girls	178	152	330
Total	379	281	660

Look at one variable

$$P(B) = \frac{330}{660} = .5000$$

$$P(Y) = \frac{379}{660} \approx .5742$$

called Marginal (simple) probabilities

$$P(B) = \frac{330}{660} = .5$$

$$+ \quad P(G) = \frac{330}{660} = .5$$

$$1.0$$

$$P(Y) = .5742$$

$$P(N) = \frac{281}{660} \approx .4258$$

$$1.0$$

What is the probability of getting a yes given the respondents is a boy?

Conditional Probabilities

$$P(Y \mid B) = \frac{201}{330} \approx .6091$$

$$P(N \mid B) = \frac{129}{330} \approx .3909$$

$$1.0$$

$$P(Y \mid G) = \frac{178}{330} \approx .5394$$

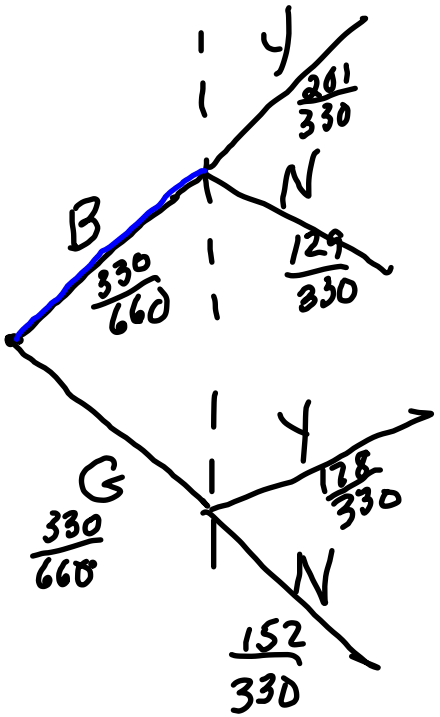
$$P(N \mid G) = \frac{152}{330} \approx .4606$$

$$1.0$$

$P(A \mid B)$ Generic

The probability of A given B (has already occurred)

$$P(B \mid Y) = \frac{201}{379} \approx .5303$$

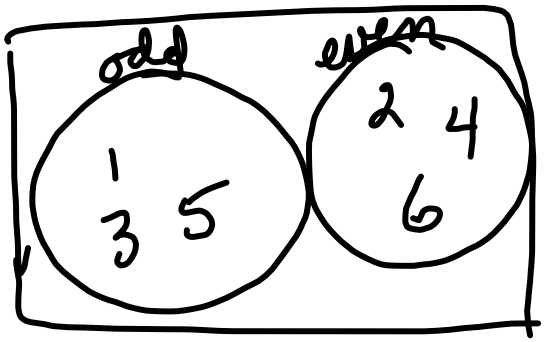


$P(Y \mid B) = \frac{201}{330}$

4.5

Mutually Exclusive Events

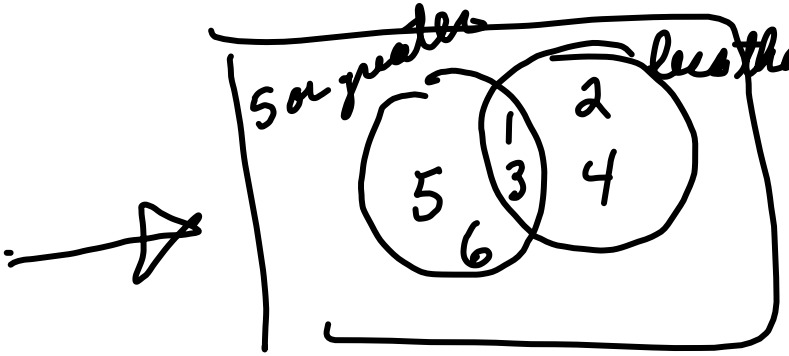
Roll a die – gets 1



$P(E) = \frac{3}{6} = .5$

$P(E \mid O) = 0$

$P(3 \mid \text{less than } 5)$



$P(3 \mid <5) = \frac{1}{4} = .25$

$P(\text{odd} \mid <5) = \frac{2}{4} = .5$

4.6 # Independent & Dependent Events

Two events are **independent** if the occurances of one does not affect the probability of the occurance of the other.

i.e. "that is" A and B are independent if either

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

OR $$P(B \mid A) = P(B)$$

dependent $P(Y) = \frac{379}{660} \approx .5742$

$P(Y \mid G) = \frac{178}{330} \approx .5394$

No, not independent

pg 152

100 total CDs

60 Mach. 1 — 9 defective

15 defective

D = defective

A = manufactured in Machine 1

are D and A independent?

	Def	Not def	total
Mach 1	9	51	60
Mach 2	6	34	40
Total	15	85	100

$$P(A) = \frac{60}{100} = .60$$

$$P(A \mid D) = \frac{9}{15} = .60$$

} independent

$$P(D) = \frac{15}{100} = .15$$

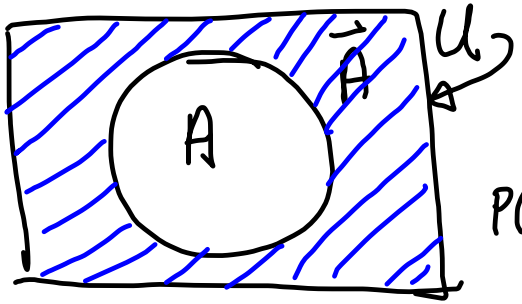
$$P(D \mid A) = \frac{9}{60} = .15$$

} yeah independent

Observe : pg 153

4.7 Complementary Events

Definition: Two mutually exclusive events that taken together includes all possible outcomes are called complementary events



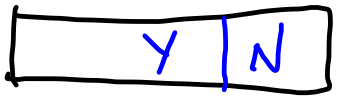
A bar = $\bar{A}$
A^c

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

$P(Y) = \frac{379}{660} \approx .5742$

$P(\text{Not } Y) = \frac{281}{660} \approx .4258$

1.0000



(24) 4-22

5000 adults asked about gun control

3500 are in favor
1200 are against
300 have no opinion

If A is in favor of gun controls what is $\bar{A}$?

$$P(A) = \frac{3500}{5000} = .70$$

$$P(\bar{A}) = \frac{1200 + 300}{5000} = .30$$

$$P(\bar{A}) = 1 - P(A) = 1 - .7 = .30$$

#4.57 pg 157

	LATE BY: Less than 30 min	30 min to 1 hr.	More than 1 hour	total
Airline A	429	390	92	911
Airline B	~~393~~	~~316~~	80	~~789~~
total	822	706	172	1700

a) i) $P(\text{more than 1 hr}) = \frac{172}{1700} \approx .1012$

ii) $P(\text{less than 30 min}) = \frac{822}{1700} \approx .4835$

iii) $P(A \mid \text{30 min to 1 hr}) = \frac{390}{706} \approx .5524$

iv) $P(\text{more than 1 hr} \mid B) = \frac{80}{789} \approx .1014$

b) Are "airline A" and "more than 1hr" mutually exclusive?

No, not mutually exclusive

c) Are P(B) and (30min - 1hr) independent?

$P(B) = \frac{289}{1700} \approx .4641$

$P(B \mid 30\text{min} - 1\text{hr}) = \frac{316}{706} \approx .4476$

No! not independent

$P(B) \neq P(B \mid 30\text{min} - 1\text{hr})$