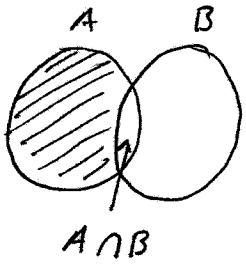


Problem 2(a)

$$\Pr(A-B)$$

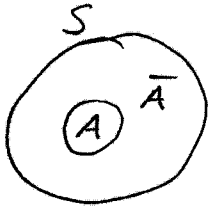
Difference Rule



$$= \Pr(A) - \Pr(A \cap B)$$

$$\Pr(\bar{A})$$

Complement Rule

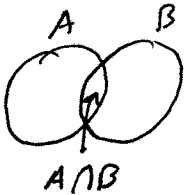


$$= \Pr(S) - \Pr(A)$$

$$= 1 - \Pr(A)$$

$$\Pr(A \cup B)$$

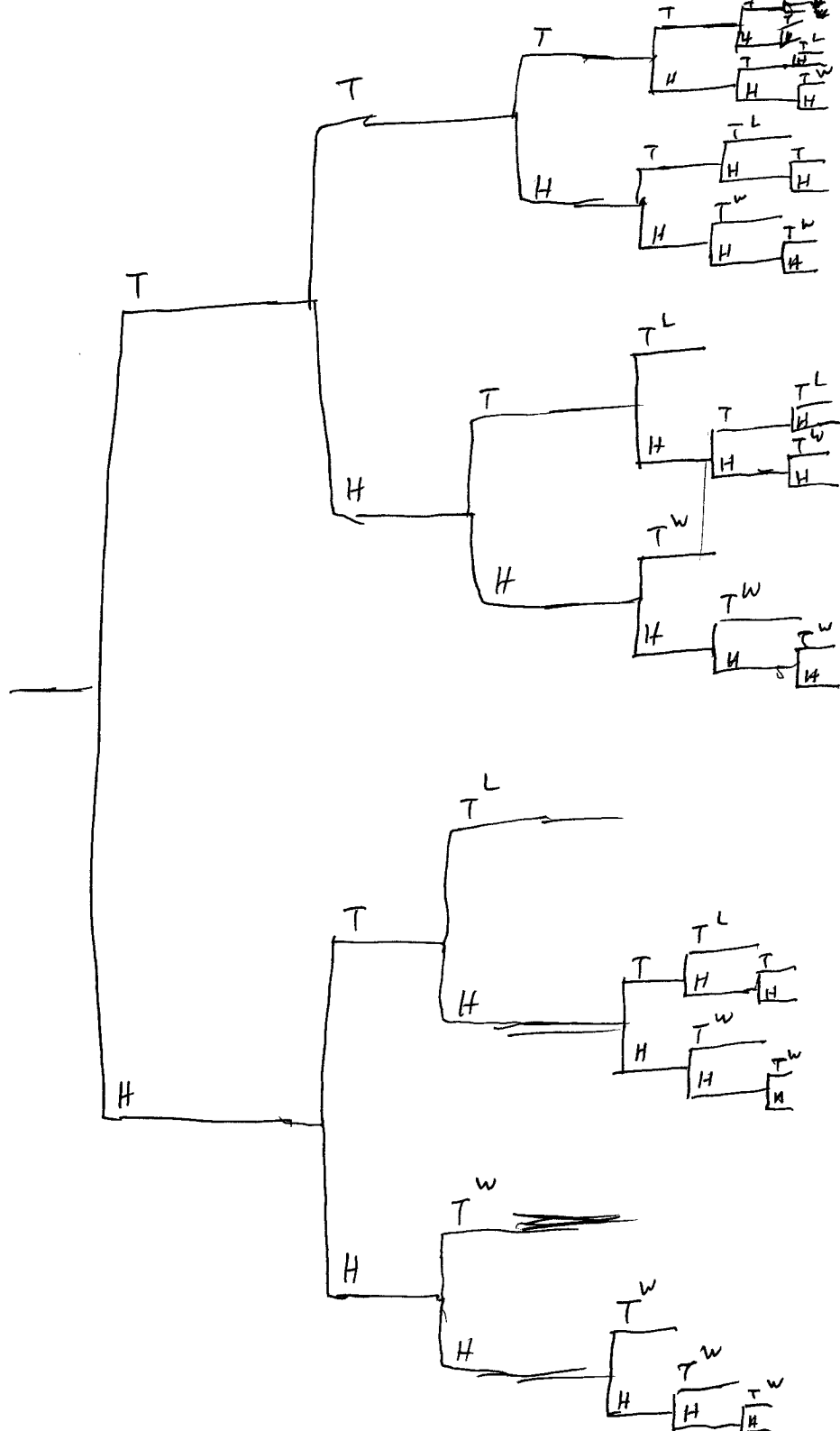
Inclusion-Exclusion



$$\Pr(A \cup B) = \Pr(A) + \Pr(B) - \Pr(A \cap B)$$

$$= \Pr(A) + \Pr(B) - \Pr(A \cap B) \quad (\text{one copy of } A \cap B)$$

Problem 4



$\frac{n}{0}$	W	L	T
0	—	—	2
1	—	—	4
2	1	1	8
3	2	1	12
4	4	2	18
5	6	2	24

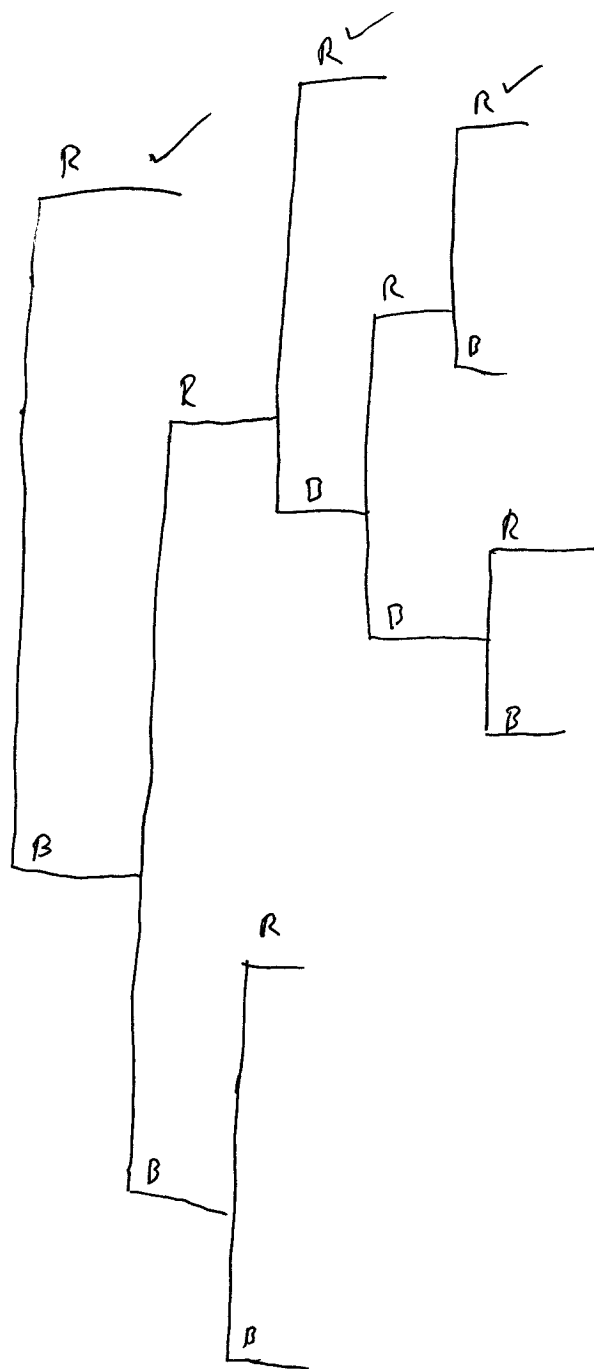
Every win, I get a win on next step.
 Every loss, I get a win and a loss two steps later.

$$W_i = W_{i-1} + L_{i-2} + 1$$

$$L_i = L_{i-2} + 1$$

$$T_i = 2(T_{i-1} - L_{i-1} - W_{i-1})$$

$$\sum_{n=0}^{\infty} \left(\frac{1}{2}\right)^{n+1} W(n) = \frac{2}{3}$$



R $-1, n=0$
 BRR $-\binom{2}{2}, n=2$
 (R) $-\binom{5}{3}, n=4$
 $BRBR$
 $BBRR$

Problem 6d

P	P
$\frac{1}{2}$	$\frac{26}{51}$
$\frac{1}{8}$	$\frac{25}{49}$

R $n=1$ $\frac{n+1}{2}$
 RR^x $n=2$

BRR
 RBR^x
 RRB^x

$$n=3 \quad \binom{n-2}{\frac{n-1}{2}} = \binom{1}{1} = 1$$

$$1 \cdot \frac{1}{2} \cdot \frac{26}{51}$$

$$1 \cdot \frac{1}{8} \cdot \frac{25}{49}$$

$RRRB^x$
 $RRBR^x$
 $RBRR^x$
 $BRRR^x$

$n=4$

$$2 \cdot \frac{1}{32} \cdot \frac{24}{47}$$

$BBRRR$ $\binom{3}{1}$
 $BRBRR$

$DRRBR^x$
 $BRRRB^x$

$RBRRB^x$

$RRBRB^x$

$RRRBB^x$

$RRBBR^x$

$RBRRR^x$

$RRROR^x$

$$n=5 \quad \binom{n-2}{\frac{n-1}{2}} = \binom{3}{2} = 3 \quad - \binom{2}{1} = 2; 3-2=1$$

RR

$$|A| + |B| - |A \cap B|$$

$$\left. \begin{array}{l} R: \frac{n+1}{2} \\ B: \frac{n-1}{2} \end{array} \right\} \frac{26 - \frac{n-1}{2}}{(26 - \frac{n-1}{2}) + (26 - \frac{n+1}{2})}$$

$$\frac{26 - \frac{n-1}{2}}{52 - n} = \frac{1}{2} \frac{(53 - n)}{52 - n}$$

$$\sum_{k=0}^{25} \left(\frac{1}{2}\right)^{2k+1} \left(\frac{1}{2} \frac{53-n}{52-n}\right) n(k)$$

n	p	Ex	$n-p-2$	#p	$\binom{n-p-2}{\frac{n-p-4}{2}}$	#ARR	$\binom{n-2}{\frac{n+1}{2}}$
1	0	R					
3	1	R	0			1	
5	1	R	2	1	$\binom{2}{0} = 1$	$\left. \begin{matrix} 1 \\ 1 \end{matrix} \right\} 2$	$\binom{3}{2} = 3$
5	3	ARR	0	1	1		

$$\left[\begin{matrix} p \\ R: \frac{p+1}{2} \end{matrix} \right] \binom{n-p-2}{\frac{n-3}{2}} R R$$

$n-2$
 $R: \frac{n-3}{2}$

$R: \frac{n-3}{2} - \frac{p+1}{2}$
 $= \frac{n-p-4}{2}$

$$[\#P] \left(\binom{n-p-2}{\frac{n-p-4}{2}} \right)$$

$$Tot: \binom{n}{\frac{n+1}{2}}$$

$$R_{tot} = \frac{n+1}{2}$$

n	$n-2$	p	$[\#P]$	$[R = \frac{p+1}{2}]$	$(R = \frac{n-p-4}{2})$	$(n-p-2)$	$\binom{n-p-2}{(R)}$	$\binom{n-2}{\frac{n-2}{2}}$	###	# SUBM	# ARR
1	1	0	—	—	—	—	—	—	—	—	1
3	1	1	1	1	—	0	—	1	—	—	1
5	3	1	1	1	0	2	1	$\binom{3}{1}$	3-1=2	1	3-1=2
5	3	3	1	2	—	0	—	$\binom{3}{1}$	—	—	—
7	5	1	1	1	1	4	4	$\binom{5}{2}$	4	5	10-5=5
7	5	3	1	2	0	2	1	$\binom{5}{2}$	1	5	—
7	5	5	2	3	—	0	—	$\binom{5}{2}$	—	—	—