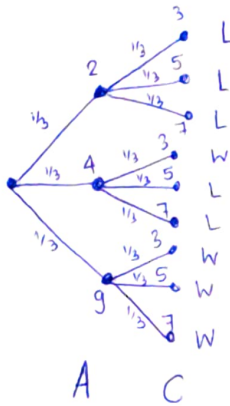


Tutorial Sheet - 12

2.

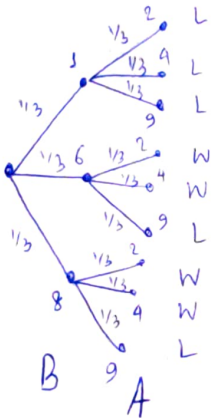
a)



$$P_r(A \text{ winning}) = \frac{1}{3} \cdot \frac{1}{3} + \frac{1}{3} \cdot \frac{1}{3} + \frac{1}{3} \cdot \frac{1}{3} + \frac{1}{3} \cdot \frac{1}{3}$$

$$= \frac{4}{9}$$

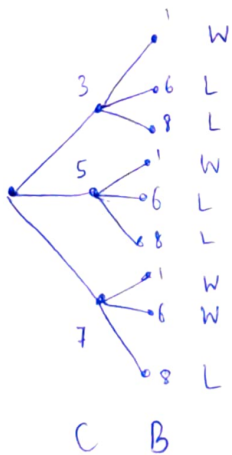
b)



$$P_r(B \text{ winning}) = \frac{1}{3} \cdot \frac{1}{3} \cdot 4$$

$$= \frac{4}{9}$$

c)



$$P_r(C \text{ winning}) = \frac{1}{3} \cdot \frac{1}{3} \cdot 4$$

$$= \frac{4}{9}$$

d) Assuming my friend chooses one of the remaining die with equal probability independent of my choice.

i) If I pick A.

$$\begin{aligned} P(\text{winning}) &= \frac{1}{2} \cdot \frac{4}{9} + \frac{1}{2} \cdot \frac{5}{9} \\ &= \frac{1}{2} \end{aligned}$$

ii) If I pick B

$$\begin{aligned} P(\text{winning}) &= \frac{1}{2} \cdot \frac{4}{9} + \frac{1}{2} \cdot \frac{5}{9} \\ &= \frac{1}{2} \end{aligned}$$

iii) If I pick C:

$$\begin{aligned} P(\text{winning}) &= \frac{1}{2} \cdot \frac{4}{9} + \frac{1}{2} \cdot \frac{5}{9} \\ &= \frac{1}{2} \end{aligned}$$

Hence no die would give more than 50% chance of winning.