

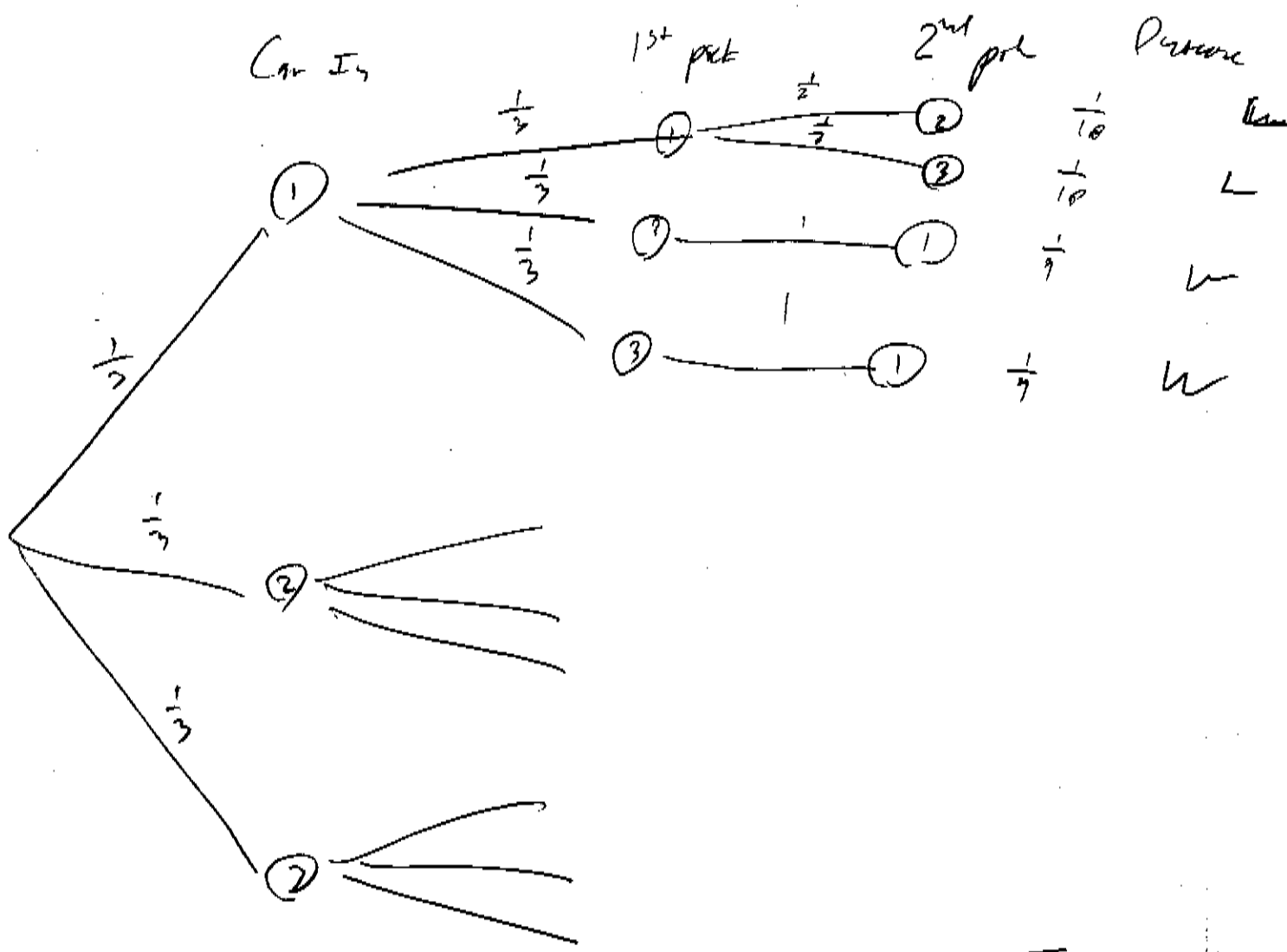
Lecture 8 2/26/15

Movie Hall Game

DEMO



-If you survive



Use Bayes Thm.



$$P(I \text{ is } D_3 \mid D_2 \text{ opens, pick } D_1 \text{ initially})$$

$$P(B_i | A, C) = \frac{P(A|B_i) P(B_i|C)}{\sum_{i=1}^n P(A|B_i, C) P(B_i|C)}$$

IND.

$$= \frac{P(D_2 \text{ opens} \mid I \text{ is } D_3, \text{ pick } D_1) P(I \text{ is } D_3 \mid \text{pick } D_1)}{P(D_2 \text{ opens} \mid I \text{ is } D_1, \text{ pick } D_1) + P(D_2 \text{ opens} \mid I \text{ is } D_2, \text{ pick } D_1) + P(D_2 \text{ opens} \mid I \text{ is } D_3, \text{ pick } D_1)}$$

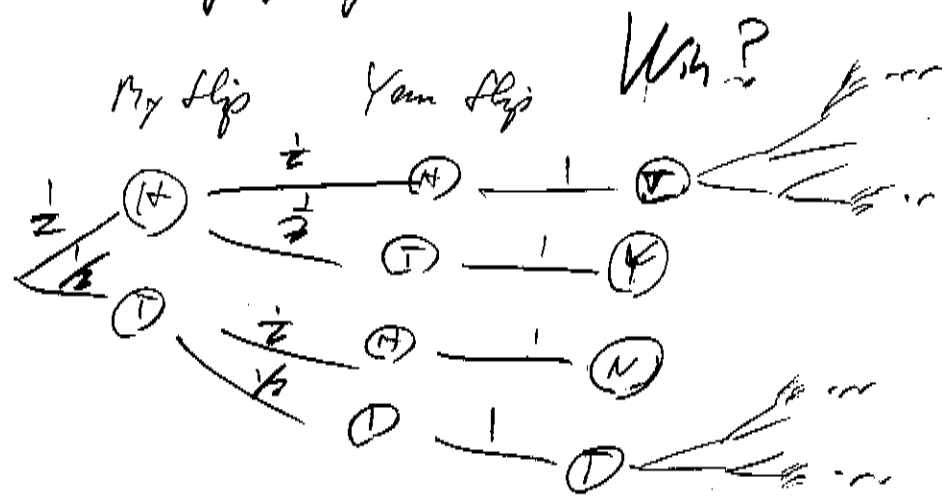
I'm free to condition on anything else

$$= \frac{1 \cdot \frac{1}{3}}{\frac{1}{2} \cdot \frac{1}{3} + 0 \cdot \frac{1}{3} + 1 \cdot \frac{1}{3}}$$

$$= \frac{\frac{1}{3}}{\frac{1}{6} + \frac{1}{3}} = \frac{1}{\frac{1}{2} + 1} = \frac{1}{\frac{3}{2}} = \boxed{\frac{2}{3}}$$

Repeat same calc for all...

Let's say we play a game. Both flip coins. If I get a H, you T, I win, if you get a H, I get a T, you win. O/T tie and play again:



$$P := P(\text{win})$$

$$P = \frac{1}{4} + \frac{1}{4}P + \frac{1}{4}P \Rightarrow P = \frac{1}{4} + \frac{1}{2}P \Rightarrow \frac{1}{2}P = \frac{1}{4} \Rightarrow P = \boxed{\frac{1}{2}}$$