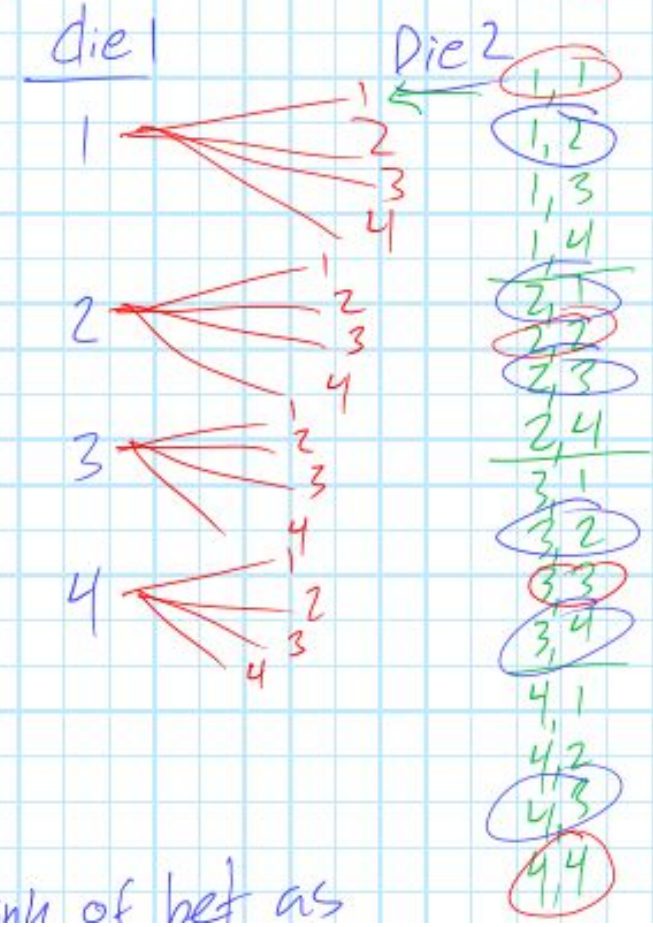
Warmup

A casino has a new game. The player rolls two D4 dice. If they match, they win double their bet (i.e. if they bet $3, they get their money back plus an extra $3). If they differ by 1 (e.g. 1 and 2, 4 and 3) they just get their money back. Is this a fair game? If not, who is favored (player or casino)?

(Start with a tree diagram and assume a bet amount)



total 16

2 times $ → $\frac{4}{16} = \frac{1}{4}$

1 times $ → $\frac{6}{16} = \frac{3}{8}$

NO $ → $\frac{6}{16} = \frac{3}{8}$

Think of bet as

4.4

Think of bet as a play fee

$1

2 times | 1 times | NO $

$$EV = \$2 \cdot \frac{1}{4} + \$1 \cdot \frac{3}{8} + \$0 \cdot \frac{3}{8}$$

$$= \$0.5 + \$0.375 + \$0$$

$$= \$0.875$$ ← NOT fair

Casino favored because less than $1