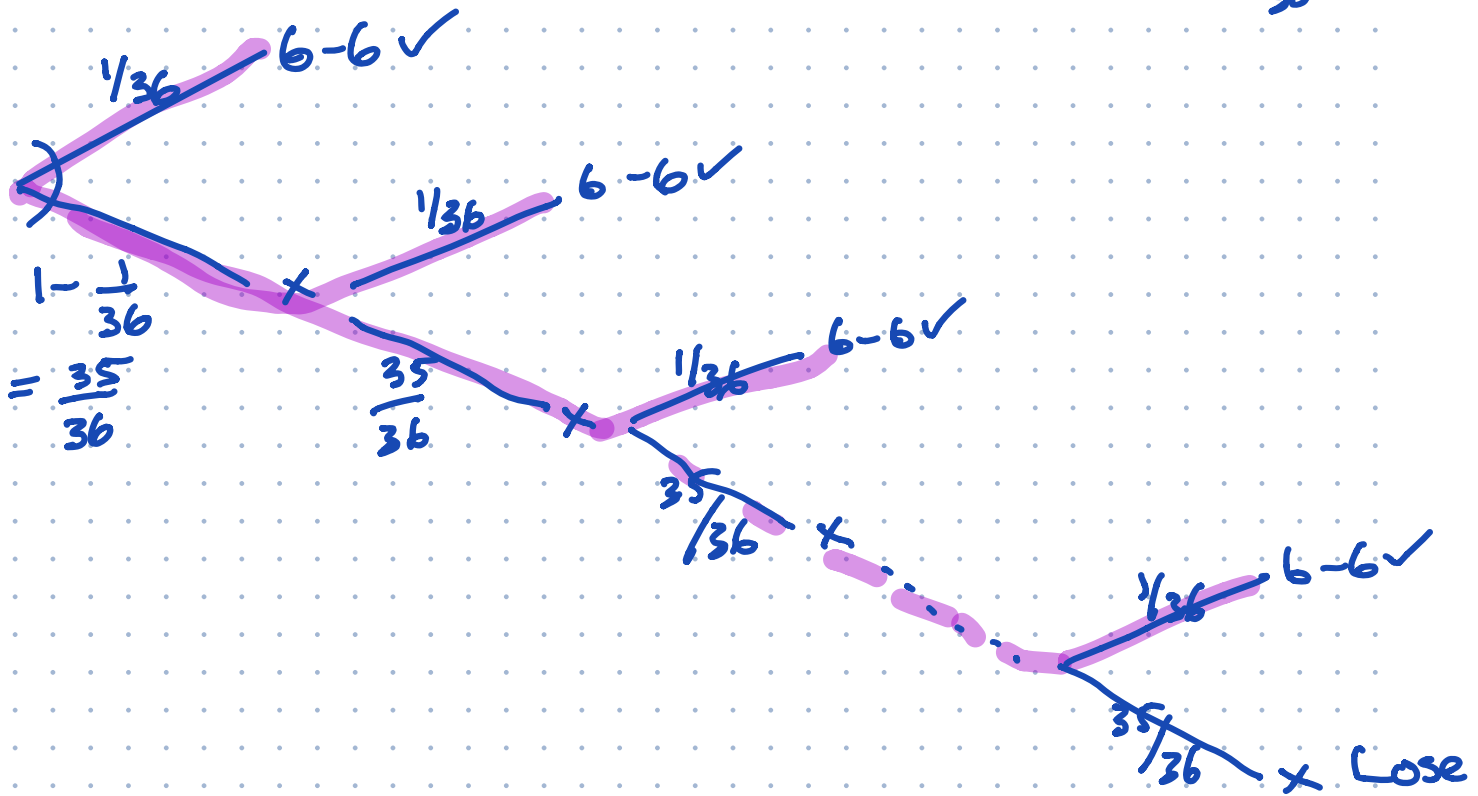


The Chevalier de Méré's question

A gambler's dispute in 1654 led to the creation of the mathematical theory of probability by two famous French mathematicians, Blaise Pascal and Pierre de Fermat. Antoine Gombaud, Chevalier de Méré, a French nobleman with an interest in gaming and gambling questions, called Pascal's attention to an apparent contradiction concerning a popular dice game. The game consisted in throwing a pair of dice 24 times; the problem was to decide whether or not to bet even money on the occurrence of at least one "double six" during the 24 throws. A seemingly well-established gambling rule led de Méré to believe that betting on a double six in 24 throws would be profitable, but his own calculations indicated just the opposite.

$$\frac{36}{36} - \frac{1}{36} = \frac{35}{36}$$



$$p(\text{win}) = \frac{1}{36} + \frac{35}{36} \cdot \frac{1}{36} + \frac{35}{36} \cdot \frac{35}{36} \cdot \frac{1}{36} + \dots + \left(\frac{35}{36}\right)^{23} \frac{1}{36}$$

$$= 1 - p(\text{lose})$$

$$= 1 - \frac{35}{36} \cdot \frac{35}{36} \cdot \frac{35}{36} \dots \frac{35}{36}$$

$$= 1 - \left(\frac{35}{36}\right)^{24} = 0.491403876$$