

Game of Craps

Indecent Proposal

A player rolls **two dice**, and the sum of the two numbers that appear is observed.

If the sum on the first roll is **7** or **11**, the player **wins** the game immediately. If the sum on the first roll is **2**, **3**, or **12**, the player **loses** the game immediately.



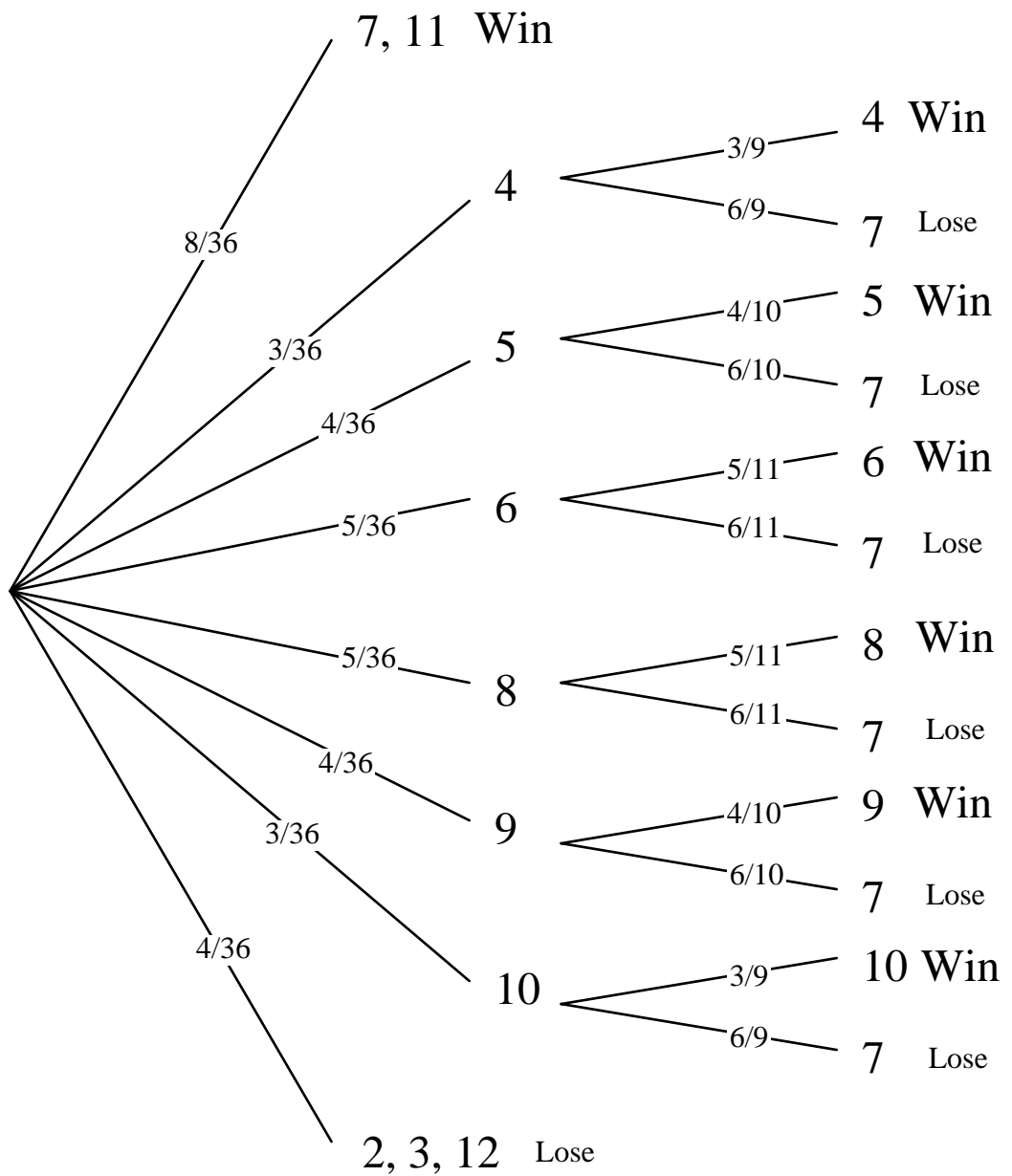
If the sum on the first roll is **4**, **5**, **6**, **8**, **9**, or **10**, then the two dice are rolled again and again until the sum is either **7** or the **original value**.

If the **original value** is obtained a second time before 7 is obtained, then the player **wins**.

If the sum **7** is obtained before the original value is obtained a second time, then the player **loses**.



Compute the probability that the player will win.



- $P[\text{Win}] = 244/495 = \mathbf{0.4929}$

- **Expected win on \$1 bet** = $1 * 244/495 + (-1) * 251/495$
 = $\mathbf{-7/495}$

- **House percentage (advantage)**

= $\text{Expected win} / \text{Amount of bet} * (-100) = \mathbf{1.41\%}$