LSU E. J. OURSO COLLEGE OF BUSINESS

Dr. Chun's Numb3rs & L∅gic

Game of Craps

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Game of Craps

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.

- **Random Variables**

  X = First number

  Y = Second number

- **Sample Space, S = (X, Y)** 36 possible outcomes!

1, 1	1, 2	1, 3	1, 4	1, 5	1, 6
2, 1	2, 2	2, 3	2, 4	2, 5	2, 6
3, 1	3, 2	3, 3	3, 4	3, 5	3, 6
4, 1	4, 2	4, 3	4, 4	4, 5	4, 6
5, 1	5, 2	5, 3	5, 4	5, 5	5, 6
6, 1	6, 2	6, 3	6, 4	6, 5	6, 6

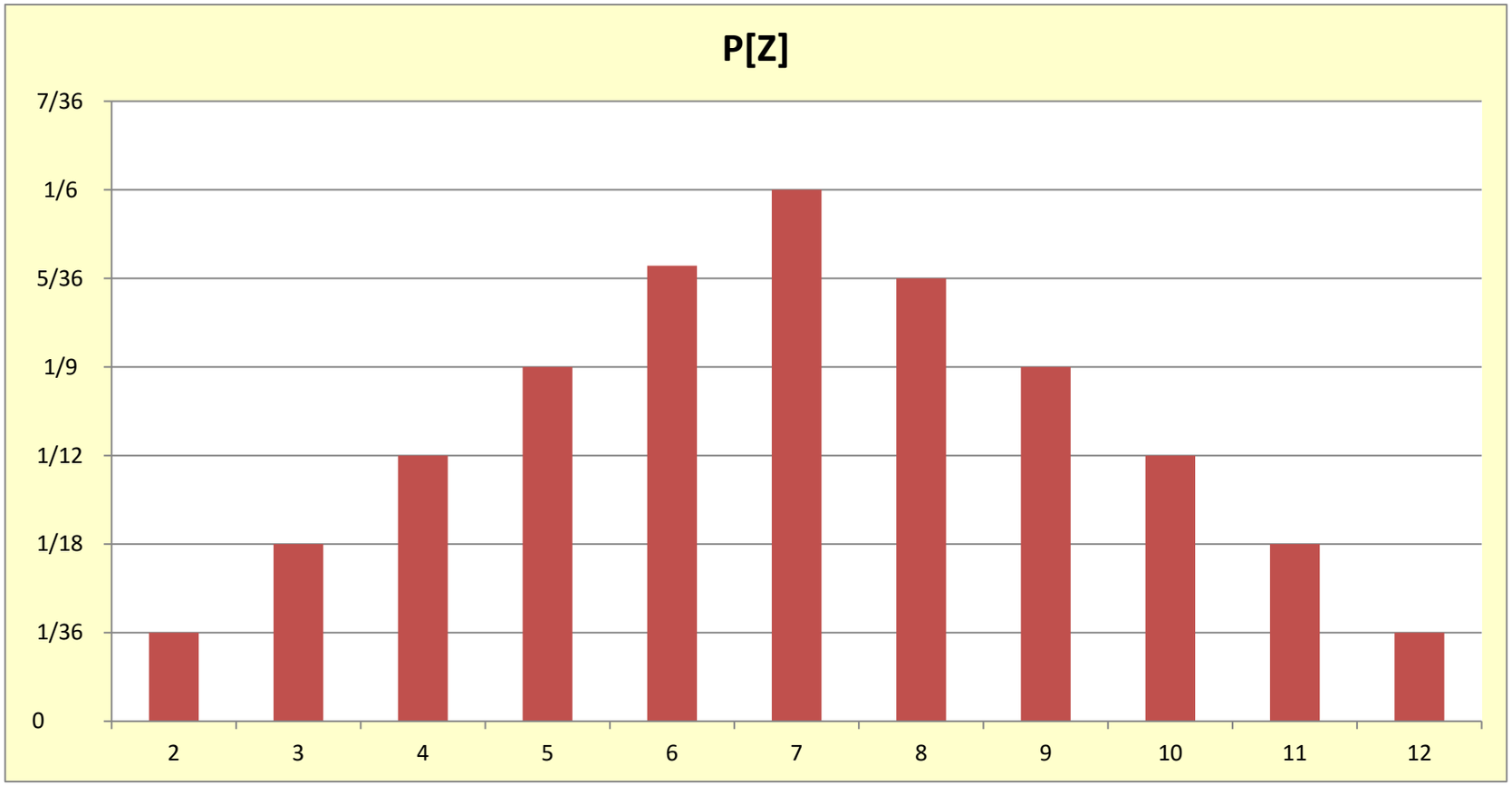
- **Probability Distribution of Z** = X + Y (Sum of the two numbers)

  P[Z = 3] = 2/36

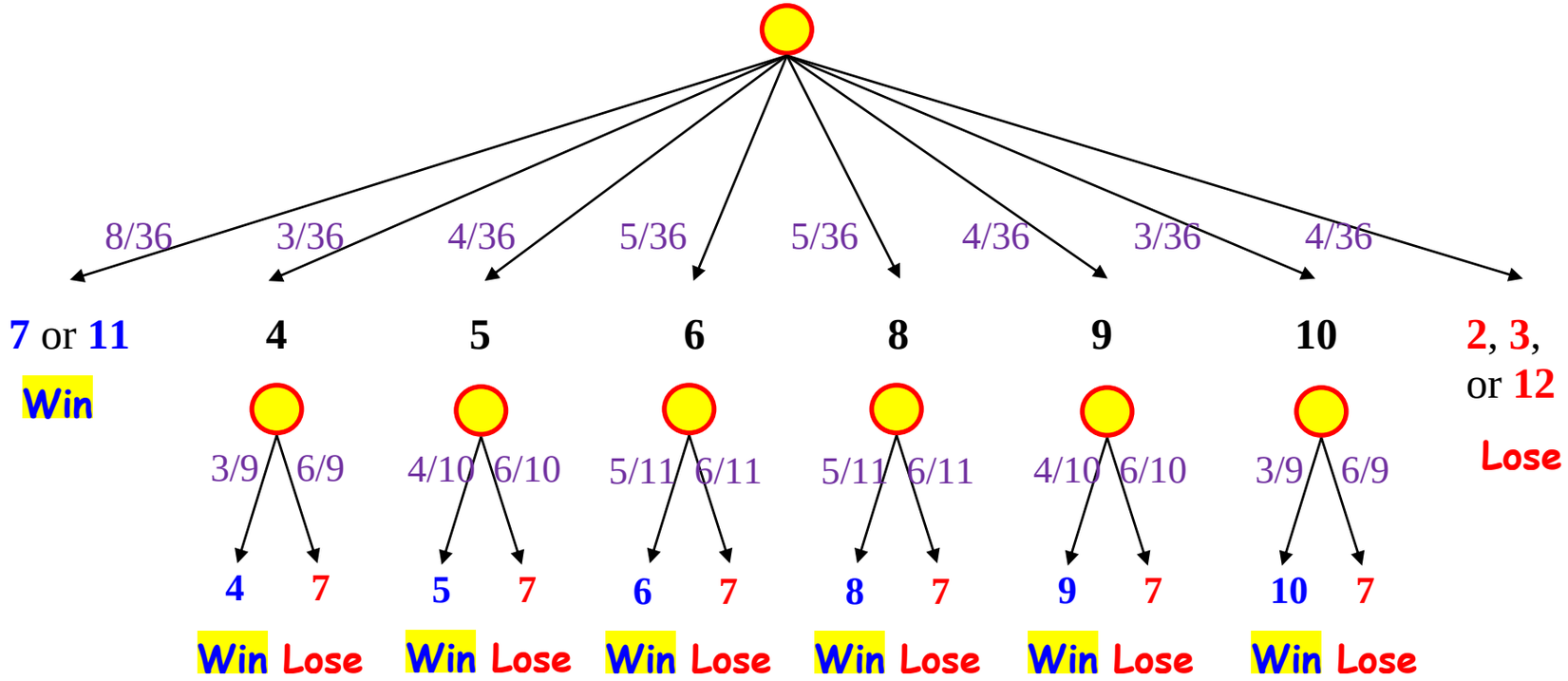
  P[Z = 7] = 6/36

  P[**Snake eyes**] = **1/36**

- **Probability Distribution of Z** (Sum of the two numbers)



Z	2	3	4	5	6	7	8	9	10	11	12
P[Z]	1/36	2/36	3/36	4/36	5/36	6/36	5/36	4/36	3/36	2/36	1/36



- **Probability distribution**

Z	2	3	4	5	6	7	8	9	10	11	12
P[Z]	1/36	2/36	3/36	4/36	5/36	6/36	5/36	4/36	3/36	2/36	1/36

- **P[Win]**

  = 244/495 = **49.29%**

- **Expected win on $1 bet**

  = 1 * 244/495 + (-1) * 251/495 = **- $ 7/495**

- **House percentage (advantage)**

  = Expected win / Amount of bet * (-100) = **1.41%**

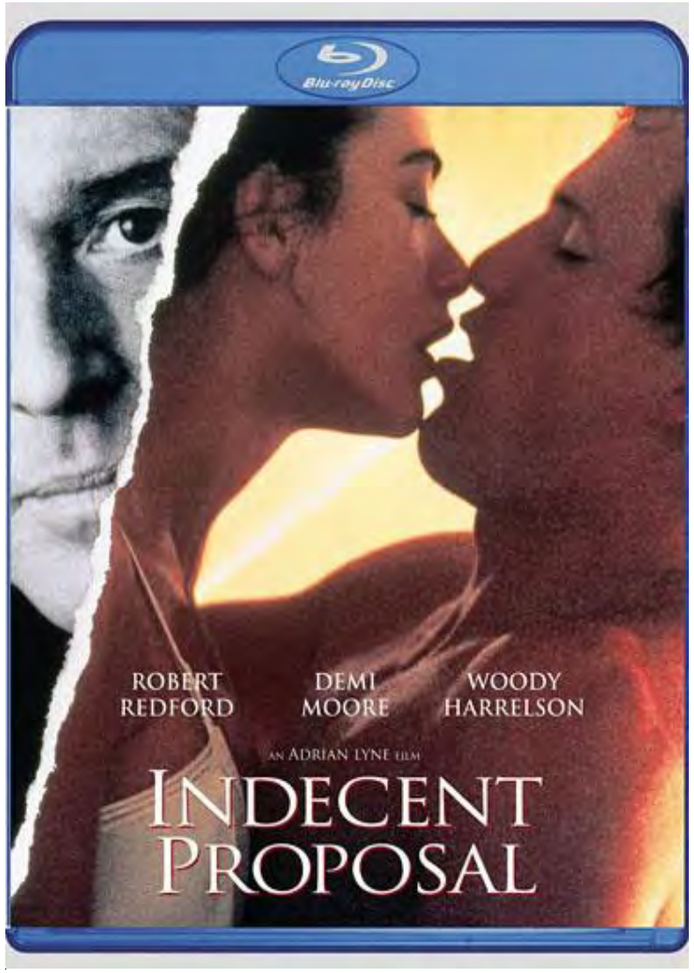
If you know the rules of the game, you can find P[Win]!

Movie Trivia

A husband. A wife. A millionaire. A proposal…

(Woody Harrelson, Demi Moore, and Robert Redford)

Indecent Proposal (1993)



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