Craps Game Name:

Place bets are bets that a given sum will be rolled before a sum of seven is rolled. Here are the payouts:

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| --- | --- | --- | --- | --- |
| Type of Bet | Probability | Odds | Payout | Expected Value |
| Place 4/10 | 3/(3+6) | 6:3 | 9:5 | (3/9)(9/5)+(6/9)(-1)=-0.07 |
| Place 5/9 | 4/(4+6) | 6:4 | 7:5 | (4/10)(7/5)+(6/10)(-1)=-0.04 |
| Place 6/8 | 5/(5+6) | 6:5 | 7:6 | (5/11)(7/6)+(6/11)(-1)=-0.02 |

Play the game several times and keep track of your bets:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type of Bet | Money on Bet | Payout | Win/Lose | Earnings/Losses |
| Examples:  Place 6 | $6 | 7:6 | Won | $7 |
| Place 4 | $5 | 9:5 | Lose | -$5 |
| Place 5 | $10 | 7:5 | Won | $14 |
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A pass bet is a bet that wins if the first roll is 7 or 11. It loses if the first roll is a 2, 3, or 12. It wins if any other first roll (4,5,6,8,9,10) comes up again before a seven is rolled.

Here is the pass the pass bet payout:

Bet Probability Odds Payout Exp. Value

Pass 244/495 251:244 1:1 -0.01

Keep track of your bets:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type of Bet | Money on Bet | Payout | Win/Lose | Earnings/Losses |
| Pass bet | $10 | 1:1 | Won | $10 |
| Pass bet | $5 | 1:1 | LOST | -$5 |
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**Pass Bet Expected Value derivation:**

A pass bet is a bet that wins if the first roll is 7 or 11. It loses if the first roll is a 2, 3, or 12. It wins if any other first roll (4,5,6,8,9,10) comes up again before a seven is rolled.

a. Find P(7 or 11 on first roll).

b. Find the probability that the first roll is rolled again before a 7 in the next steps.

i. P(4 on first roll) \* P(4 again before 7 is rolled)

ii. P(5 on first roll) \* P(5 again before 7 is rolled)

iii. P(6 on first roll) \* P(6 again before 7 is rolled)

iv. P(8 on first roll) \* P(8 again before 7 is rolled)

v. P(9 on first roll) \* P(9 again before 7 is rolled)

vi. P(10 on first roll) \* P(10 again before 7 is rolled)

c. Add all the quantities in parts a and b to find the probability of winning the pass bet.

d. Subtract 1 by the probability of winning to find the probability of losing.

e. The payout of the pass bet is 1:1. Find the expected value of the pass bet.