Craps Game Name:

**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).

(6+2)/36 = 0.22222

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)

(3/36) \* (3/(3+6)) = 0.0278

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

(4/36) \* (4/(4+6)) = 0.0444

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

(5/36) \* (5/(5+6)) = 0.063

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

(5/36) \* (5/(5+6)) = 0.063

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

(4/36) \* (4/(4+6)) = 0.0444

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

(3/36) \* (3/(3+6)) = 0.0278

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

0.22222 + 2(0.0278)+2(0.0444)+2(0.063)= 0.493

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

1-0.493=0.507

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

($1)( 0.493) + ($-1)( 0.507) = -$0.014

Therefore, for every dollar you bet on the pass line, you expect to lose just over one penny.