Rolling 9s for $50

Question:

Suppose you are playing a game where there are two fair six-sided dice, and every time you roll the dice and they add up to 9, you win $50. However, to roll the dice costs $20 to play. Is this a game you're willing to play?

My Solution:

There are two dice, each with 6 sides, meaning the total number of possible combinations is 6 x 6 = 36. The chances of rolling two dice which total 9, depends on the number of possible combinations: 3 & 6, 4 & 5, 5 & 4 and 6 & 3. This gives us 4 possible ways to roll a total of 9. Therefore, the chance of winning is 4/36 while the chance of losing is 32/36.

Because each roll of the two dice are independent from every other roll, we can look at it as what would be the expected payout or cost, if negative, per roll. This assumes that 4 out of every 36 tosses, we win $30 ($50 winning minus $20 entry fee) and 32 out of 36 we lose $20.

Plugging this into a probability formula:

Expected value per roll of 2 dice = probability of winning x profit of winnings + probability of losing x cost of losing

Expected value per roll of 2 dice = (4/36) x ($30) + (32/36) x (-$20)

= $3.33 + (-$17.78)

= -$14.45

Therefore, this game is expected to COST the player about $15 per roll. This is not a game I would be willing to play.