Tracing & Hypothesis

Bug 5: Odds of game are incorrect

1 Tracing

As mentioned above, the inclusion of SPADE may change the win ratio.

First, considered that there are n faces in the game. There are n^3 possible combinations of 3 dices. The player will lose if the pick is not the same as any of the dices, which means the losing pick lays within the domain of $(n-1)^3$. The winning ratio is calculated as:

$$winning\ ratio = 1 - \frac{(n-1)^3}{n^3}$$

So if there are 6 DiceValues, the winning ratio will be approximately 0.42:

$$winning\ ratio = 1 - \frac{(6-1)^3}{6^3} = 1 - \frac{125}{216} = 0.4212$$

If there are 5 DiceValues (excluding SPADE), the winning ratio will raise up to 0.48 or 0.49 as in the bug example below.

$$winning\ ratio = 1 - \frac{(5-1)^3}{5^3} = 1 - \frac{64}{125} = 0.488$$

2 Hypothesis

The root of this bug is the same as bug 4 above - no SPADE in the game. So by adding the SPADE, the winning will be resolved.