1. The joint distribution of X, Y, Z is

Where a, b, c are any non-negative integers with a + b + c = n, since is the probability of any specific configuration of choices for each player with the right numbers in each category, and the coefficient in front counts the number of distinct ways to permute such a configuration.

1. The game is decisive if and only if exactly one of X, Y, Z is 0. These cases are disjoint so by symmetry, the probability is 3 times the probability that X is zero and Y and Z are nonzero. Note that if X = 0 and Y = k, then Z = n-k. This gives

Since by binomial theorem. Therefore, when n = 2 this reduces to 2/3, which makes sense since for 2 players, the game is decisive if and only if the two players do not pick the same choice.

1. For n = 5, the probability is As which makes sense If the number of players is very large, it is very likely that there will be at least one of each Rock, Paper and Scissors.