March Madness – March 21, 2016

Problems & Solutions

The NCAA Men's Division I Basketball Championship Tournament, often referred to as March Madness, officially began last week. In total, 68 teams were selected to enter the tournament. There were 8 teams that played in four play-in games, the winners advanced to the round of 64 teams. After the play-in games, the 64 teams compete in the single-elimination tournament until a National Champion is determined. At the end of this tournament, including the four play-in games, what is the total number of basketball games that will be played?

In a single-elimination tournament with 64 teams, each team will be matched up with another team for the first round. So there will be 64 ÷ 2 = 32 games. The first round will eliminate the 32 losing teams, and the 32 winning teams will move on to the second round. Similarly, these 32 teams will play 32 ÷ 2 = 16 games. This continues until 1 team is left. The next four rounds will consist of 16 ÷ 2 = 8 games, 8 ÷ 2 = 4 games, 4 ÷ 2 = 2 games and 2 ÷ 2 = 1 game. Including the 4 play-in games, there will be 4 + 32 + 16 + 8 + 4 + 2 + 1 = 67 games.

The 64 team tournament bracket consists of four regions. The winner of each region will be part of the Final Four or semifinals of the tournament. How many possible Final Four team combinations are there?

Since there are 64 teams and 4 regions, each region has 64 ÷ 4 = 16 teams. One of each group of 16 will end up in the Final Four. Therefore, there are 16^4 = 65,536 Final Four team combinations.

Many college basketball fans fill out a March Madness bracket each year with their predictions of who will win each game. It is extremely rare for anyone in the country to end up with a perfect bracket (every game picked correctly). If you want to fill out enough brackets to ensure that you have a perfectly filled out bracket, not including the play-in games, for the 64 team single-elimination tournament, how many brackets would you need to fill out? Express your answer in scientific notation to three significant digits.

Each game has 2 possible outcomes. Without considering the 4 play-in games, there will be a total of 67 – 4 = 63 games in the bracket. The number of possible outcomes for 63 games is 2^{63}. So in order to guarantee you've filled out a perfect bracket, you must fill out 2^{63} = 9.22 × 10^{18} brackets.
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