Riddler Classic - December 23rd

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1 Solution explanation

To solve this, one would need to obtain a general expression for N such that the probability of playing a 100 *non-repeating random tracks* from this playlist of a total N songs exceeds 0.5. To obtain this, one would have to find the ratio of the number of combinations of 100 successive non-repeating possible songs that can be played from this playlist to the total number of possible plays given a 100 tracks being played. For a 100 tracks being played, the total number of possible song combinations (including repeats) would simply be N^{100}. The number of *non-repeating combinations* would be as follows -

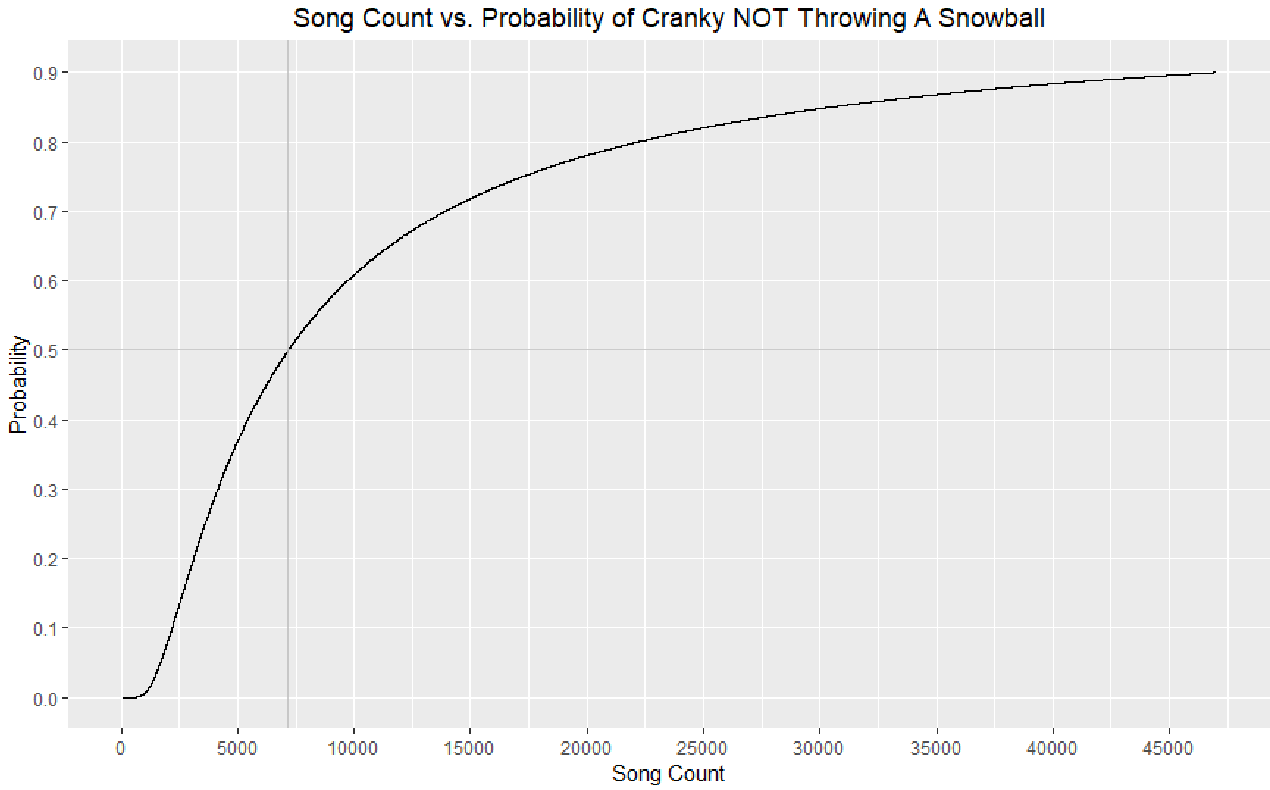
$$N_{NoRepeat} = \prod_{i=0}^{99}(N-i) \tag{1}$$

On dividing numerator by denominator, we would obtain our required probability

$$P(Cranky\,Not\,Throwing\,Snowballs) = \frac{\prod_{i=0}^{99}(N-i)}{N^{100}} \tag{2}$$

On setting P to 0.5 (as Cranky lost it about half the time), we obtain a value of $N = 7175$.

The following graph depicts the number of songs required for different probabilities of Cranky not living up to his name.



All code can be found here.