

Coupon Collector Problem

- The Problem: Suppose inside each cereal box, there is one of twelve possible coupons. On average, how many cereal boxes will be required to collect all twelve coupons?
- Play the Game: Roll the twelve sided die and record the number of rolls it takes to roll every one of the twelve numbers. Record the number of rolls it takes to roll each new distinct number. Record your outcomes in the chart below.

Die #													Total
# of Rolls													

- Notation:

- Question 1: Will the average value S_n/n change if the group plays the game again?

- Question 2: How is the variability of the average value S_n/n affected by the number of people n that play the game?

- Test conjecture from Question 2: Average value of 12-sided die.
 1. Roll 12-sided die twice and record $S_2/2$.
 2. Roll 12-sided die six times and record $S_6/6$.
 3. Roll 12-sided die ten times and record $S_{10}/10$.

- Question 3: What number does S_n/n seem to go to as n increases?

- Expected value:

1. Definition:

2. Compute expected value of outcome of 12-sided die.

3. Law of Large Numbers:

4. Property of expected value:

- Expected value of Coupon Collector Problem:

1. Notation:

2. Expected value of C_i :

3. Expected value of Coupon Collector Problem: