Lotto
Solution example

Prof Hans Georg Schaathun
Hgskolen i lesund

August 23, 2013

Exercise 1 *What is the probability of getting 7 correct numbers in a lotto ticket (playing one row only)?*
The draw selects 7 random numbers out of a pool of 34 numbers. You need to start by calculating the number of possible 7-sets that can be drawn.

1 Solution

The draw has a pool $P = \{1, 2, 3, \ldots, 34\}$ of numbers, and selects a random subset $S \subset P$ of seven elements. The first question to answer is the number of possible sets S.

We can use the standard formula for the number of k-sets contained in an n-set, given by the binomial formula:
$$\binom{n}{k} = \frac{n!}{k!(n-k)!}.$$
In our case, $n = 34$ and $k = 7$, so we get

$$N = \binom{34}{7} = \frac{34!}{7!27!} = \frac{34 \cdot 33 \cdot 32 \cdot 31 \cdot 30 \cdot 29 \cdot 28}{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 34 \cdot 11 \cdot 16 \cdot 31 \cdot 29 \approx 5.38 \cdot 10^6.$$

The probabily of betting on the correct row (7-set), is $1/N$, i.e. about one in five million.