One more fact about hypergeometric random variables.

If N is large and n is small, the fact that we do not replace items after they are picked because almost irrelevant, since the population N is large and we are just picking a few, n, so it doesn't matter too much if they are replaced.

Such a hypergeometric is very similar in distribution to a Binomial random variable, with same n picks and $p = \frac{M}{N}$ is the probability of success each time.

This can ease calculations a lot.

Example: Say 40000 people at a convention, 3000 of them are CEO's, and we meet 15 people in a group (without replacement).

Let X be the number of people in the group who are CEO's.

Then X is hypergeometric with $N = 40000$ $\quad M = 3000$ $\quad n = 15$

$N - M = 37000$

E.g. $P(X=2) = \dfrac{\binom{3000}{2}\binom{37000}{13}}{\binom{40000}{15}}$ ← hard to do on a handheld calculator

$= 0.214405\ldots\ldots$

Easier to consider Y a Binomial$\left(n=15,\ p = \frac{3000}{40000} = \frac{3}{40}\right)$

$$P(Y=2) = \binom{15}{2}\left(\frac{3}{40}\right)^2\left(\frac{37}{40}\right)^{13} = 0.214365\ldots\ldots$$

pretty close to $P(X=2)$ and easier to calculate on a handheld calculator.