

Assuming the random variables are distributed according to a discrete uniform. (Tbh, this model is with replacement, but the answers you get aren't much different than without replacement if $n \ll N$.)

$$X_i \sim P(X = x|N) = \frac{1}{N} \quad x = 1, 2, \dots, N \quad i = 1, 2, \dots, n$$

3. What is the method of moments estimator of N ?

4. What is the maximum likelihood estimator of N ?