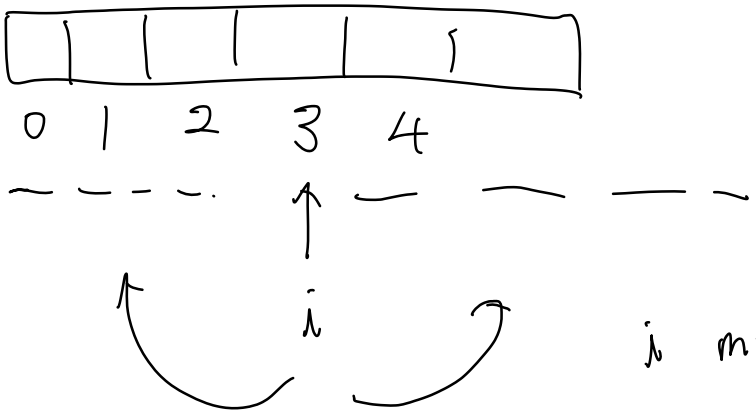
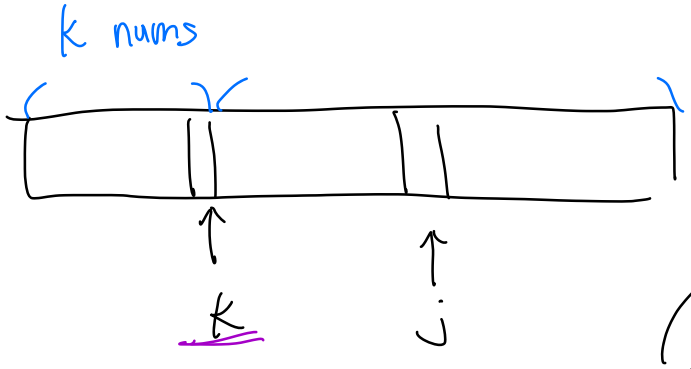
Fisher - Yates shuffle proof



i must have $\frac{1}{n}$ in any $j \in [0, n)$

Assume: $j \in [0, n)$, we want to compute the probability of i be placed at j



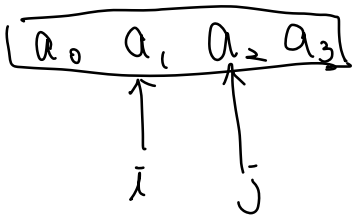
for k in [0, n-2]:
  j = a num in [k, n-1]
  swap(arr[k], arr[j])

If k is the index in our loop, (if i is selected to the left, it can never be at j)
that means i is not selected to the left of k, and when the k = j

j is selected

$$\Rightarrow \left(\frac{n-1}{n} \times \frac{n-2}{n-1} \times \cdots \frac{j}{j+1}\right) \times \frac{1}{j} = \frac{1}{n} \#$$

Ex.



the probability of i be placed at j