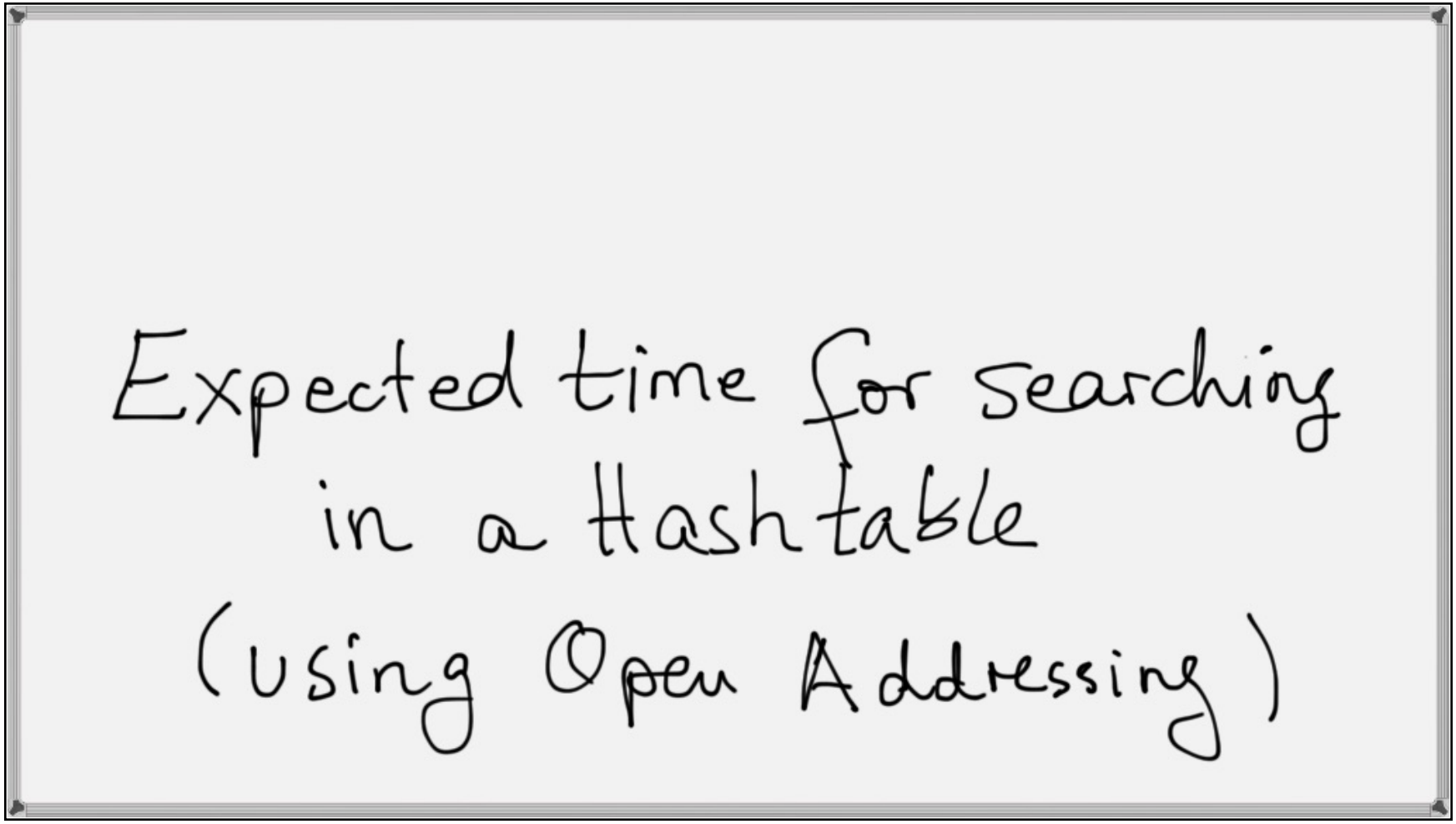
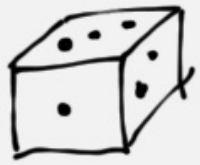


https://youtu.be/0VhbvrU9mg0

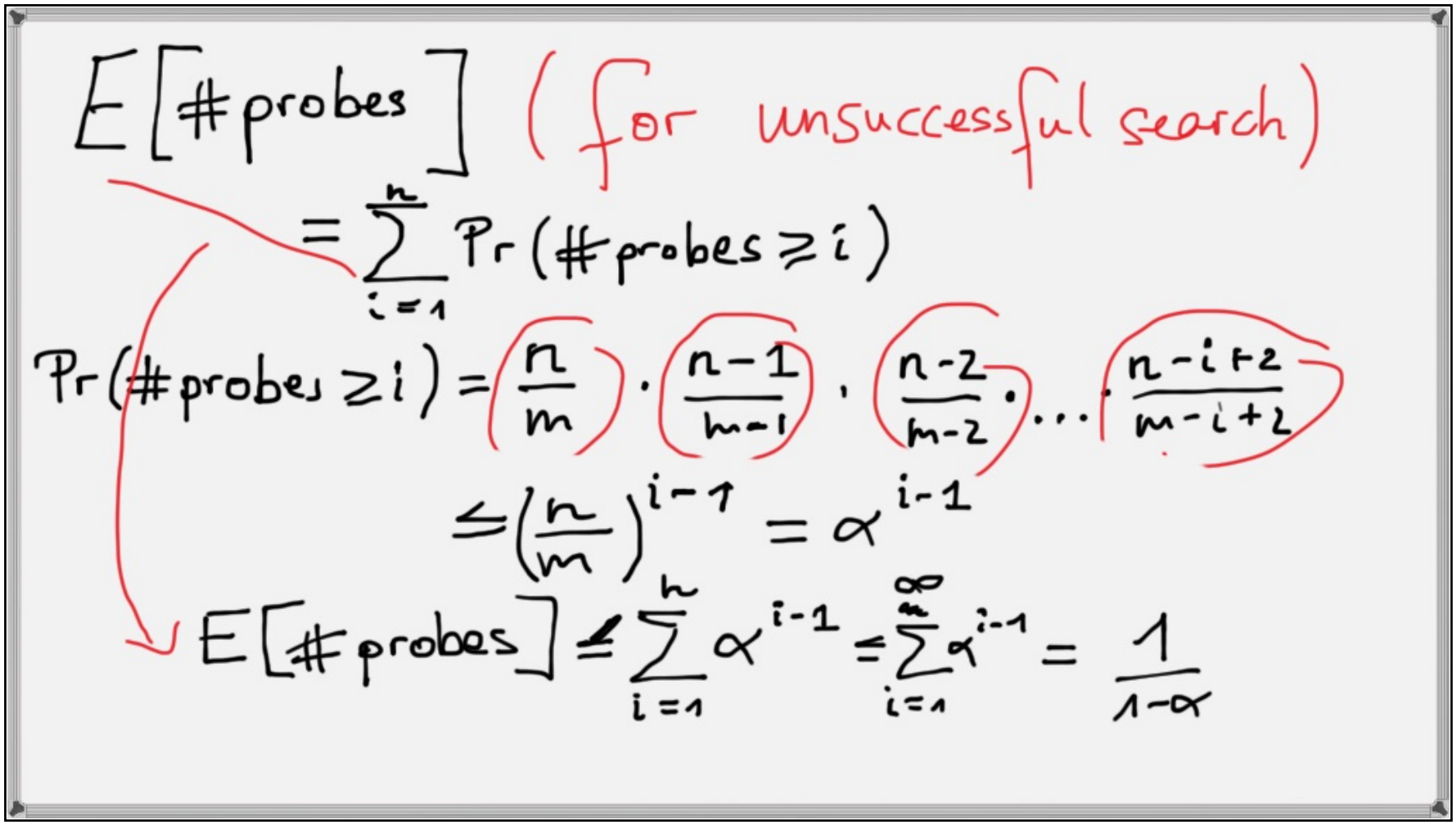
Reminder: Expected value/mean

Example: $X \sim$ result of 

Mean $E[X] = \frac{1}{6} \cdot 1 + \frac{1}{6} \cdot 2 + \ldots + \frac{1}{6} \cdot 6$

$= \frac{21}{6} = 3.5$ $\sum_{i=1}^{6} i \cdot Pr(X=i)$

$\sum_{i=1}^{6} Pr(X \geq i) = 1 + \frac{5}{6} + \frac{4}{6} + \ldots + \frac{1}{6} = \frac{21}{6} = 3,5$


E[#probes] (for unsuccessful search)
= Σ_{i=1}^{n} Pr(#probes ≥ i)
Pr(#probes ≥ i) = n/m · (n-1)/(m-1) · (n-2)/(m-2) · ... · (n-i+2)/(m-i+2)
≤ (n/m)^{i-1} = α^{i-1}
E[#probes] ≤ Σ_{i=1}^{n} α^{i-1} ≤ Σ_{i=1}^{∞} α^{i-1} = 1/(1-α)