We know $\gamma = \# \text{ leopardo in 1st catch}$ $n = \# \text{ leopardo in 2nd catch}$ $i = \# \text{ marked leopardo in 2nd}$ Catch. We need to determine $N = \# \text{ leopardo}$ in SGNP. This is an MLE p-roblem and uses the dart that the r.v. X, which stands for the number of marked animals in the 2nd catch, has a hypergeometric distribution. P(X=i;N)= C(r,i) C(N-r,n-i) C(N,n) For what N does this likelihood P(X=i;N) affain its maximum value? For this we consider to find N such that P(X=i;N) > P(X=i;N-i) → ① P(X=i;N) > P(X=i;N+i) → ② For ① we have	Refer to slides on hypergeometric distr. in ecology.
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For D we have	$(\lambda \circ A)$
	$P(X=i; N) > P(X=i; N+1) \longrightarrow (2)$
(N-r, n-i) > (N-r-l, n-i)	For (1) we have
	(N-r, n-i) > (N-r-l, n-i)
C(N,n) $C(N-1,n)$	$\frac{C(r,i)C(N-r,n-i)}{C(N,n)} > \frac{C(r,i)C(N-r-l,n-i)}{C(N-l,n)}$

 $\frac{(N-r)!}{(n-b)!(N-r-n+i)!} > \frac{(N-r-1)!}{(n-b)!(N-r-1-n+i)!}$ $\frac{N!}{n!(N-n)!} \frac{(N-1)!}{n!(N-n-1)!}$ $\frac{N-r-n+i}{N-n} \rightarrow \frac{1}{N-n}$ $\longrightarrow N^2 - N_n - N_r + r_n \rightarrow N^2 - N_r - N_n + N_i$ $\longrightarrow N \leftarrow r_n/i$ From (2) we have $\frac{C(n, i) C(N-r, n-i)}{C(N, n)} > \frac{C(r, i) C(N+1-r, n-i)}{C(N+1, n)}$ $\frac{(N-r)!}{(n-i)!} \frac{(N-r-n+i+1)!}{(n-i)!} \frac{(N-r-n+i+1)!}{(N-r-n+i)!}$ $\frac{1}{\sqrt{N-\gamma+1}}$ N-7-n+i+1 $\frac{N+1}{N-n+1} > \frac{N-r-n+i+1}{N-r-n+i+1}$ -xN+rn-x

i. $N < m$ and $N > m - 1$ i. $N = m$ or its floor (to be an integer) This is the MLE of N given r, n, i . Notice that we are not using any calculus here.
i
:. N = rn or its floor (to be an
integer)
This is the MLE of N given your, i.
Notice that we are not using any
calculus here.