

$$f(p) = N p (1-p)^{N-1}$$

$$\max_{p^*} f(p) ?$$

Note Title

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$$\left. \frac{df(p)}{dp} \right|_{p^*} = 0$$

$$\frac{df(p)}{dp} = N(1-p)^{N-1} + Np(N-1) \cdot (-1) \cdot (1-p)^{N-2}$$

$$\Rightarrow N(1-p^*)^{N-1} = Np^*(N-1) \cdot (1-p^*)^{N-2}$$

$$1-p^* = p^*(N-1) \Rightarrow p^* = \frac{1}{N}$$

$$f(p^*) = N \cdot \frac{1}{N} \cdot \left(1 - \frac{1}{N}\right)^{N-1} = \left(1 - \frac{1}{N}\right)^{N-1} \Rightarrow \frac{1}{e} \quad N \rightarrow \infty$$

