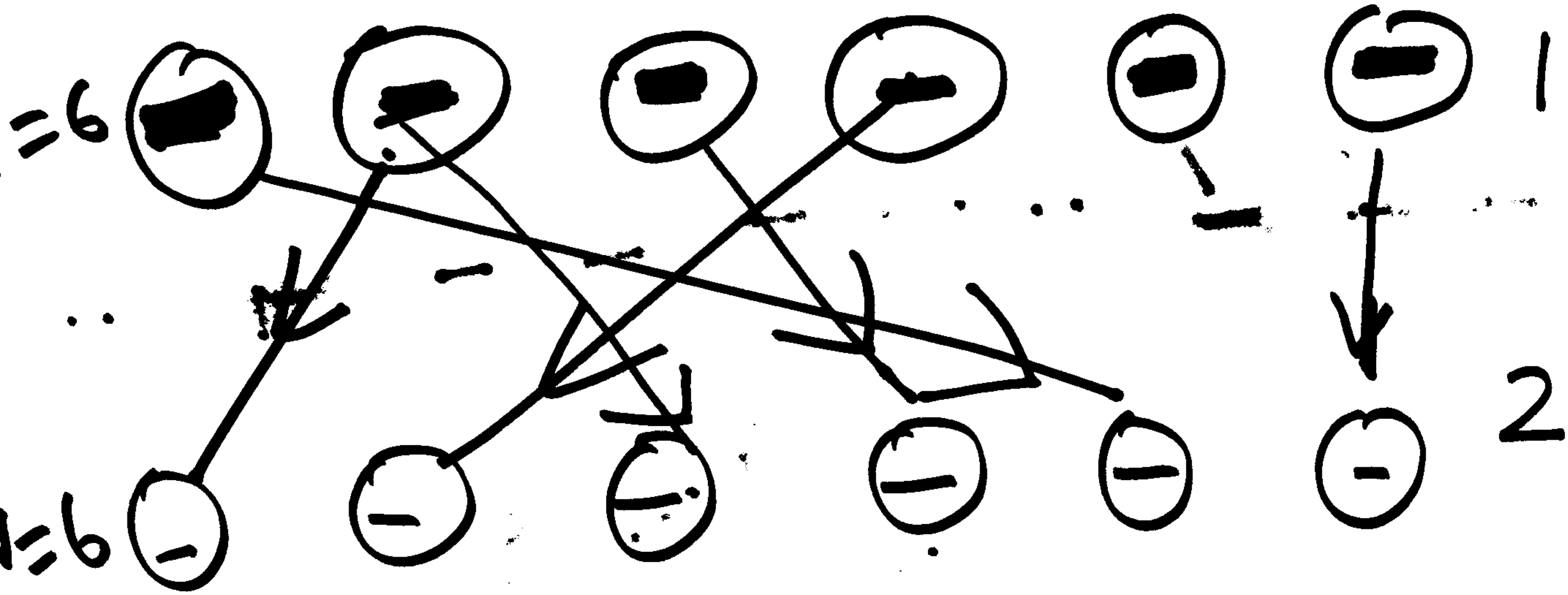
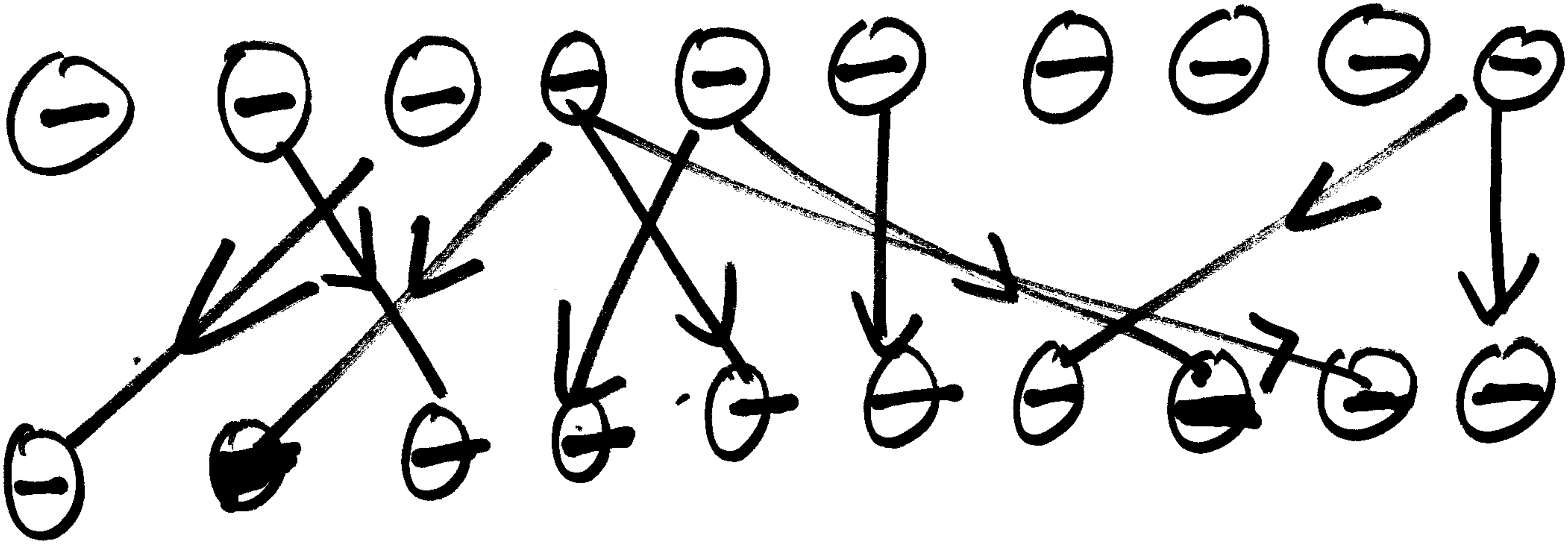
Prof

Wright-Fisher Model





P(3 red)?

Prob. of having 7 red in the next generation given that $\frac{3}{10}$ is red in the current generation

$$\boxed{{}^{10}C_{7} \left(\frac{3}{10}\right)^{7} \left(1-\frac{3}{10}\right)^{3}}$$

$$ {}^{10}C_{7} = \frac{10!}{7!\,(10-7)!} = \frac{1\cdot 2\cdot 3\cdot 4 \cdots 10}{1\cdot 2\cdot 3\cdot 4 \cdots 7 \cdot 1\cdot 2\cdot 3} $$

$$ = (\quad) $$

$$ {}^{N}C_{K} = \frac{N!}{K!\,(N-K)!} $$

$$G(n,k,p)$$

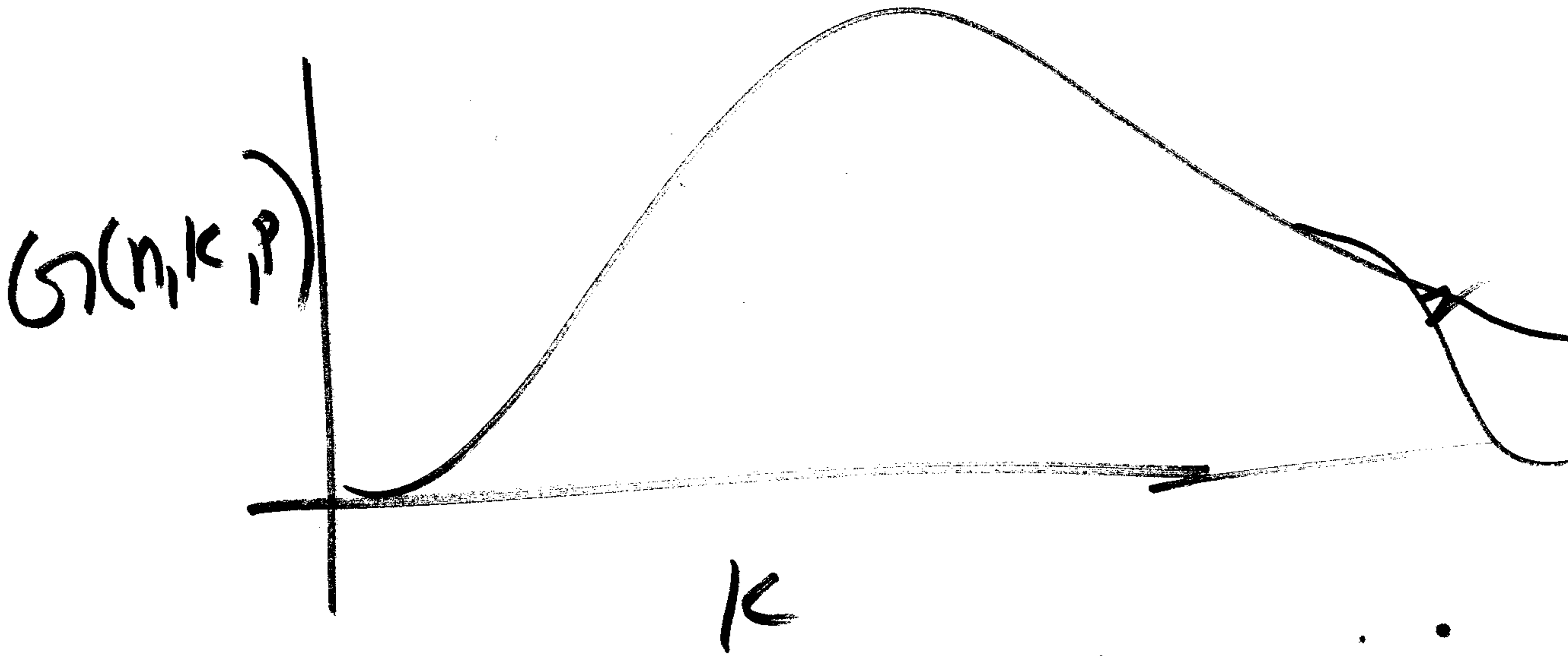
$$\langle k \rangle = \sum_{k=0}^{n} k\, G(n,k,p)$$
$$= np$$

$$\langle k^2 \rangle = \sum_{k=0}^{n} k^2\, G(n,k,p)$$

$$\langle k^2 \rangle - \langle k \rangle^2 = \text{variance}$$

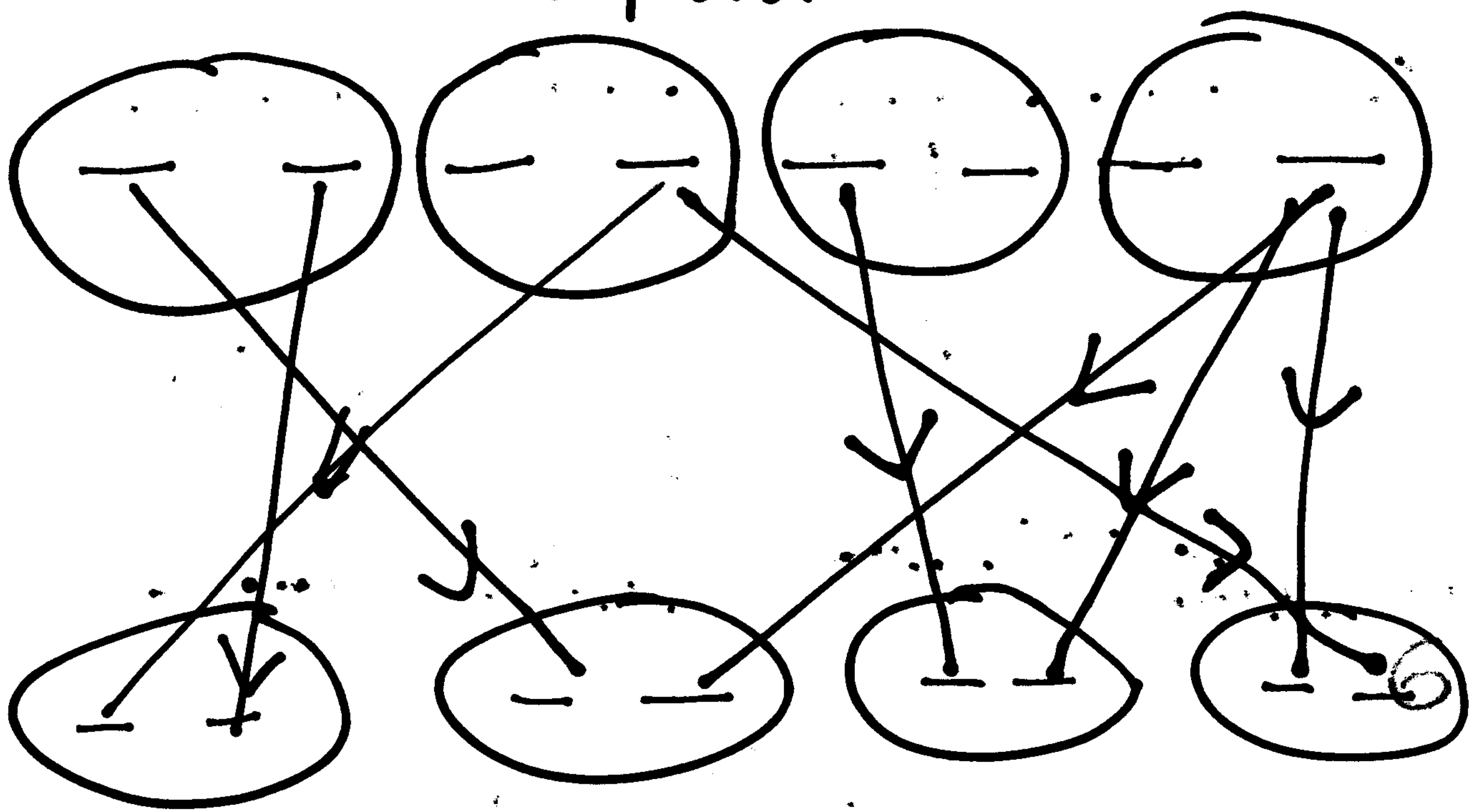
$$= \underline{np(1-p)} = npq$$

$$\sigma = \sqrt{\langle k^2 \rangle - \langle k \rangle^2}$$

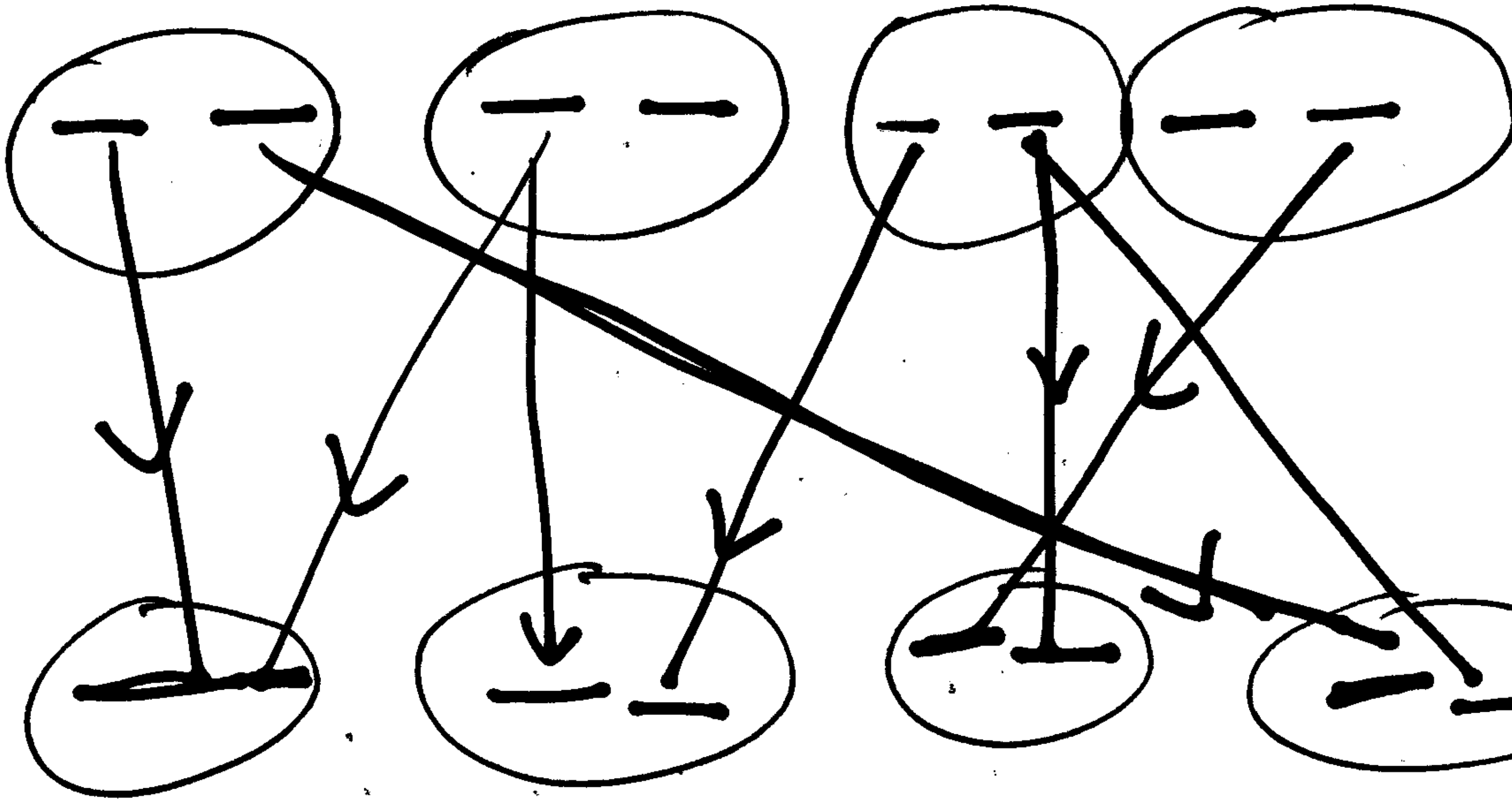

G(n,k,p)
k

Mean first passage time

Diploid



Allow random mating



4
4

2
6

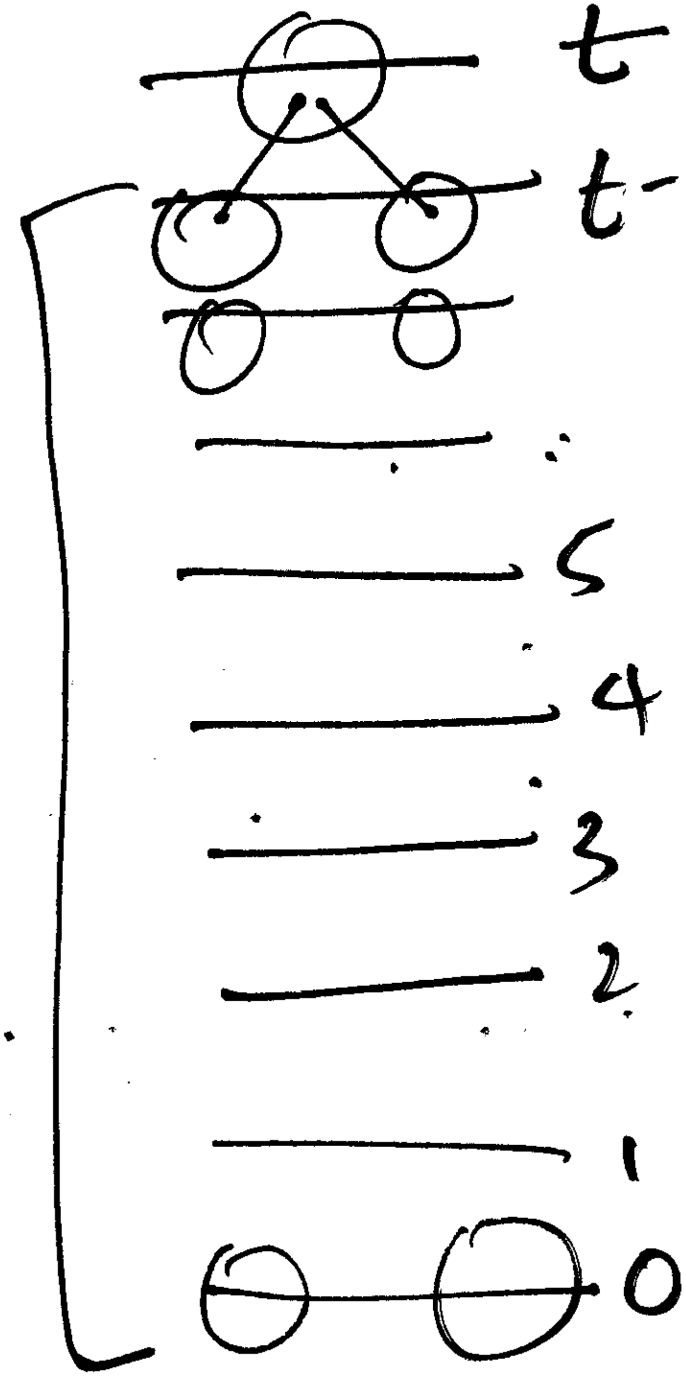
$\cancel{P(4)}$ $\frac{4}{8} \rightarrow \frac{6}{8}$

$G = {}^{8}C_{6} \left(\frac{1}{2}\right)^{6} \left(\frac{1}{2}\right)^{2}$

$S =$ Prob. of having common parent in the previous generation

$1-S$: Prob. of NOT having a common parent in the previous generation

$$\underbrace{(1-S)(1-S)\cdots(1-S)}_{(t-1)\text{ times}}\, S$$



Prob. of

$\underline{H}\ \underline{T}$ $\frac{1}{2}$

H H

H T

T H

T T

$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$

$(1-s)(1-s) \ldots$