1St Ü1

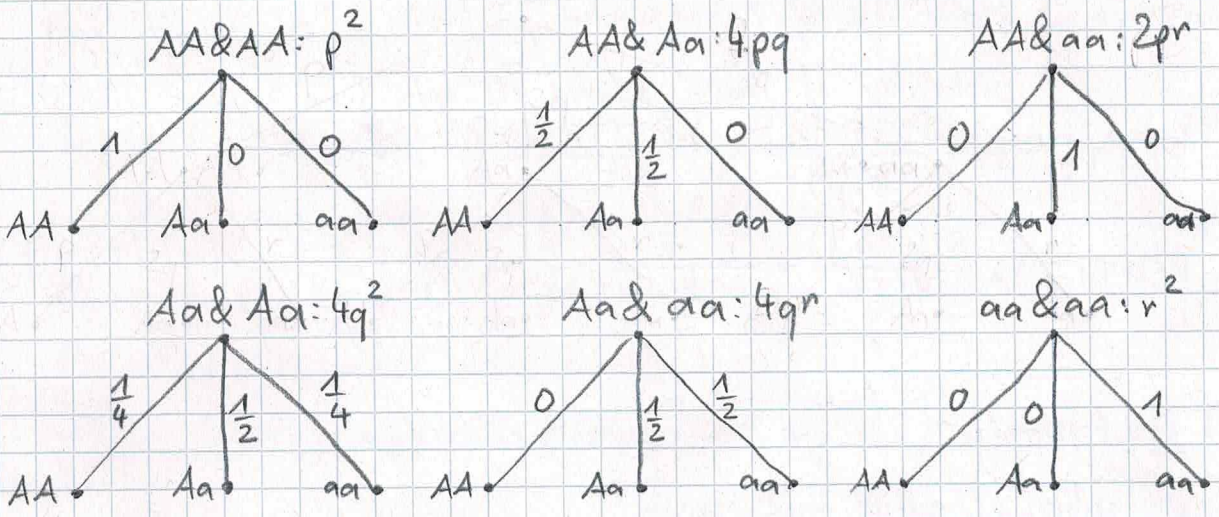
(4) genetic model

(a) AA & Aa — AA $1 \cdot \frac{1}{2} = 0{,}5$

Aa $1 \cdot \frac{1}{2} = 0{,}5$

(b) first generation AA... p Aa... 2q aa... r with $p+2q+r=1$

probability of second and third generation?



$\Rightarrow$ second generation: AA: $p^2 + 4pq\frac{1}{2} + 4q^2\frac{1}{4} = p^2+2pq+q^2 = (p+q)^2 \; (=c^2)$

Aa: $4pq\frac{1}{2} + 2pr + 4q^2\frac{1}{2} + 4qr\frac{1}{2} = 2(p+q)(q+r) \; (=2cd)$

aa: $4q^2\frac{1}{4} + 4qr\frac{1}{2} + r^2 = q^2 + 2qr + r^2 = (q+r)^2 \; (=d^2)$

third generation: renaming $c := p+q$ $d := q+r$ $c^2+2cd+d^2 = (c+d)^2 \overset{*}{=} 1$

AA& AA: c^4 AA& Aa: $4c^3d$ AA& aa: $2c^2d^2$

Aa& Aa: $4c^2d^2$ Aa& aa: $4cd^3$ aa& aa: d^4

AA: $c^4 + 4c^3d\cdot\frac{1}{2} + 4c^2d^2\cdot\frac{1}{4} = c^4 + 2c^3d + c^2d^2 = c^2(c+d)^2 = c^2$

Aa: $4c^3d\cdot\frac{1}{2} + 2c^2d^2 + 4c^2d^2\cdot\frac{1}{2} + 4cd^3\cdot\frac{1}{2} = 2c^3d + 2c^2d^2 + 2c^2d^2 + 2cd^3$

$= 2cd(c^2+2cd+d^2) = 2cd(c+d)^2 = 2cd$

aa: $4c^2d^2\frac{1}{4} + 4cd^3\frac{1}{2} + d^4 = c^2d^2 + 2cd^3 + d^4 = d^2(c^2+2cd+d^2) = d^2(c+d)^2$

$= d^2$

$\overset{*}{(c+d)^2} = (p+q+q+r)^2 = (p+2q+r)^2 = 1^2 = 1$