Evolutionary Genetics In-Class Exercise

NAME: ANSWERS

EQUATIONS:

$$\varpi = p^2\omega_{11} + 2pq\omega_{12} + q^2\omega_{22}$$

$$p_{n+1} = p(p\omega_{11} + q\omega_{12})/\varpi$$

If the fitnesses of AA, Aa, aa are 1.0, 0.9, 0.6 and $p_0 = 0.7$, calculate p_1, p_2, and p_3 the allele frequencies after 1, 2, and 3 generations of selection.

$\overline{w}_0 = (.7)^2(1) + 2(.7)(.3)(.9) + (.3)^2(.6)$

$\overline{w}_0 = .49 + .378 + .054$

$\overline{w}_0 = .922$

$P_1 = \dfrac{.7(.7 \times 1 + .3 \times .9)}{.922} = \dfrac{.679}{.922} = \boxed{0.7364}$

$\overline{w}_1 = (.7364)^2(1) + 2(.7364)(.2636)(.9) + (.2636)^2(.6)$

$\overline{w}_1 = .5423 + .3494 + .0417$

$\overline{w}_1 = .9334$

$P_2 = \dfrac{.7364(.7364 \times 1 + .2636 \times .9)}{.9334} = \dfrac{.7170}{.9334} = \boxed{0.7682}$

$\overline{w}_2 = (.7682)^2(1) + 2(.7682)(.2318)(.9) + (.2318)^2(.6)$

$\overline{w}_2 = .5901 + .3205 + .0322$

$\overline{w}_2 = .9428$

$P_3 = \dfrac{.7682(.7682 \times 1 + .2318 \times .9)}{.9428} = \dfrac{.7504}{.9428} \boxed{0.7959}$