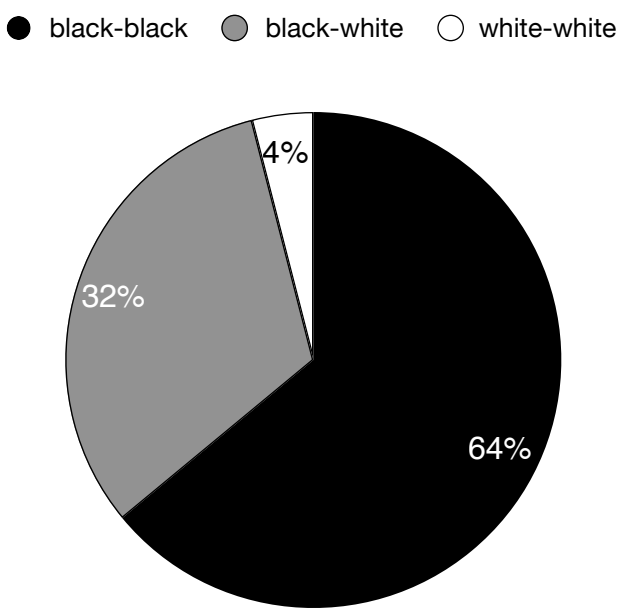
Genotype frequencies, allele frequencies, and natural selection



The genotype frequencies in newly-formed zygotes in generation 1 are:

0.64 black-black
0.32 black-white
0.04 white-white

Q1. What are the allele frequencies? (give your answers as fractions, not decimal numbers.)

(black allele) p =

(white allele) q =

Q2. Find the genotype frequencies in newly-formed zygotes in generation 1 using the allele frequencies. Show how you obtained your result, and express the genotype frequencies in the form of fractions rather than decimal numbers.

black-black:

black-white:

white-white:

Q3. What are the genotype frequencies (as fractions) in the pool of potential parents in generation 1 if the following fitnesses are assumed?

0.5 fitness of black-black
1.0 fitness of black-white
1.0 fitness of white-white

black-black:

black-white:

white-white:

Q4. What is the mean fitness?

Q5. What are the allele frequencies in gametes generated by the parents in generation 1 (after selection)?

black:

white:

Q6. What are the genotype frequencies in newly-formed zygotes in generation 2?

black-black:

black-white:

white-white:

Q7. What are the allele frequencies in the newly-formed zygotes in generation 2?

black:

white:

Q8. Has the frequency of the black allele increased or decreased over one generation? (Compare your answer to Q1 with your answer to Q7.)

Q9. Would your answers to Q5, Q6, and Q7 change if the following fitnesses had been used? Explain.

1 fitness of black-black
2 fitness of black-white
2 fitness of white-white

For reference (not all of these will be needed):

4/5 = 0.8	1/5 = 0.2	16/25 = 0.64	8/25 = 0.32	1/25 = 0.04
5/17 = 0.29	12/17 = 0.71	(12)(12) = 144	(12)(5) = 60	(5)(5) = 25
85/289 = 0.29	204/289 = 0.71	(17)(17) = 289	17/25 = 0.68	34/25 = 1.36