BIO 5099

Homework Assignment #2

Name_____

Due start of class, **Tuesday September 3rd**
Late assignments are not accepted
Assignments may be e-mailed to: christiaan@xiaan.com or rbaror@dmibio.com anytime, or faxed to (303) 556-2889 between 3:00 and 4:00 p.m. on Tuesday.

Define **in your own words** and give an example:

1. (2pts) Ecosystem

2. (2pts) Parasitism

3. (2pts) Mass extinction

4. (2pts) Centromere

5. (2pts) Write a single sentence that demonstrates your understanding using at least two of the following terms: Hardy-Weinberg, recessive, inbreeding.

6. (10pts) Suppose a pea plant population under Hardy-Weinberg equilibrium has two independent traits for flower color and plant height. Suppose the A allele is dominant (purple flowers), a is recessive (white flowers). The B allele is dominant (tall plants), b is recessive (short plants). Suppose you cross two plants; one AABB, one AaBb.

   a) What are the genotype frequencies for these first generation (F1) plants?

b) In the F1 generation, what are the allele frequencies for flower color?

c) Suppose you have a tall purple plant from the F1 generation. With what genotype would you cross this plant to determine its genotype?

d) Describe exactly how to obtain a pure strain of tall white pea plants.

e) Using the equation $p^2 + 2pq + q^2 = 1$ explain why the genotype frequency of heterozygotes for flower color can never be more than 0.5.

7. (6pts) A population has allele frequencies f(A) = 80% and f(a) = 20%. The fitness of each genotype is $w_{AA}=1$, $w_{Aa}=1$, $w_{aa}=0.8$.

a) What are the allele frequencies in this population after two generations?

b) Will the aa genotype ever be eliminated? Why?

c) After two generations, are the genotypes in Hardy-Weinberg equilibrium?

8. (5pts) Hardy-Weinberg equilibrium is reached only under certain conditions, including an infinite population, mutation, migration, etc. Explain why selection pressure causes Hardy-Weinberg equilibrium to fail.

9. (5pts) In the space below, draw a timeline showing a) the time from 3.85 Ga to the present, b) the names of the 4 major eras during that time and the relative amount of time spanned by each, d) a unique sample organism for each of the 4 major eras (i.e. not present in any other era), and e) indicate on your timeline the relative amount of time spanned by the “era of man”.

10. (4pts) Name each of the kingdoms and describe one of their distinguishing characteristics.