

Problem Set #2 Genetics 320 Due Sept 12, 11AM.

Answer 1 OR 2. Answer 3 OR 4 Answer 5 or 6. Answer 7

You will have answers to 4 questions total.

Please provide very short and to the point answers- economy of language is important!

1. Describe in a few sentences two aspects, features, or examples of “complexity” in biological systems as we discussed in class.
2. Define what a Gene Family is, and how it arose in evolution, and what role mutations plays in their generation.
3. What is a “mutagen”? Discuss whether it causes forward mutations reverse mutations, or both.
4. Name two elements that can be used to identify a gene merely from the DNA sequence.
5. Fluctuation tests:
 - a. What hypotheses does a fluctuation analysis test?
 - b. Discuss whether a fluctuation test can be done with forward mutations, reverse mutations, neither or both. Describe if phage resistance and penicillin resistance can or cannot be used in a fluctuation test. Are the number of mutants higher with the forward mutation or reverse mutation and WHY (if in fact both can be used in fluctuation tests!)

6. A complementation table is shown below for a diploid organism. Lets say the mutations effect whether the fly has legs (+) or not (-) . One row has the maternal chromosome, the other the paternal chromosome.

Which mutations are dominant and which are recessive?

How many genes are identified unambiguously?

Is there a mutation for which it is unclear if it is a different gene then identified by the other mutations, and if so why is it unclear?

	wt	m2	m3	m4	m5	m6
wt	+	+	-	+	+	+
m2		-	-	-	+	+
m3			-	-	-	-

m4	-	+	+
m5		-	-
m6			-

7. Discuss how the arrangement of DNA sequences (synteny) between mouse and human genomes resembles the arrangement of sequences between normal Ch22 and Ch9 and the Philadelphia chromosome. (They are both examples of evolution at work!)