Name:

Introduction to Genetic Analysis

Problem Set #1-2

Please answer the following questions on a **SEPARATE SHEET OF PAPER**.

Problem 1: Complementation Test

You have isolated a collection of yeast mutants that form small colonies when plated on a concentration of the drug geldanamycin that does not affect the growth of wild type cells. Geldanamycin sensitive mutants 1–10 are MATa and mutants 11–21 are MATα. As mentioned in lecture, MATa can only mate with MATα. Your analysis begins by pairwise mating of each mutant to a wild-type strain and to the mutants of the opposite mating type.

The size of the colonies of the resulting diploids is shown in the table below ("wt" indicates wild-type colony size following geldanamycin treatment, "-" indicates small colony size following treatment):

	Wild-type	11	12	13	14	15	16	17	18	19	20	21
Wild-type	wt	-	wt	wt	wt	wt	-	wt	-	-	wt	wt
1	wt	-	wt	wt	wt	wt	-	wt	-	-	wt	-
2	wt	-	wt	-	wt	wt	-	-	-	-	-	wt
3	wt	-	wt	-	wt	wt	-	-	-	-	-	-
4	wt	-	-	wt	-	-	-	wt	-	-	wt	wt
5	wt	-	wt	-	wt	wt	-	-	-	-	-	wt
6	wt	-	wt	-	wt	wt	-	-	-	-	-	wt
7	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-
9	wt	-	-	wt	-	-	-	wt	-	-	wt	wt
10	wt	-	-	wt	-	-	-	wt	-	-	wt	wt

a) Which of the mutants are dominant and which are recessive?
b) What is anomalous about the behavior of Mutant 3? Provide a simple genetic explanation.
c) Organize the 21 mutations into complementation groups (genes). Please indicate any remaining ambiguities.

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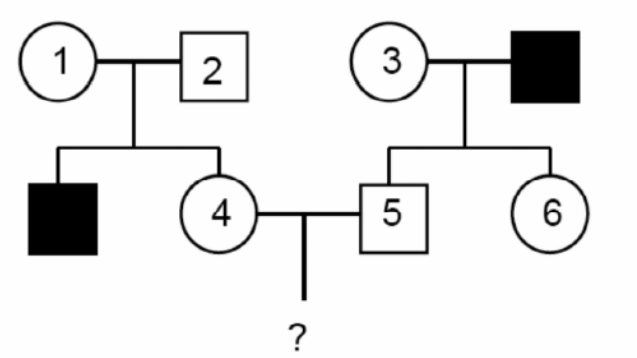
Problem 2: Probability & Bayes' Theorem

In the following pedigree assume that no new mutations arise. You may further assume that each possible mode of inheritance (autosomal recessive, autosomal dominant, X-linked recessive, X-linked dominant) has equal a prior probability. (Show your work).



a. What is the probability that ? is an affected male, assuming an X-linked recessive trait.

b. What is the probability that ? is an affected male, assuming an autosomal recessive trait?

c. What is the probability that ? is an affected female, assuming an X-linked recessive trait?

d. Given that ? is an affected male, what is the probability that this pedigree describes an autosomal recessive trait?

e. What is the probability ? will be affected without knowing the sex of the individual?