Dr. Reichler's Bio 311D Exam #1 February 10, 2010 Print Name:_____KEY_____

Read each question carefully and don't hesitate to ask if a question seems unclear. If possible, answer each question in the space provided, but if needed, continue on the back. If you use a drawing as part of your answer, be sure to also include a written explanation. **For any inheritance problem, you must show your work to receive partial credit.** These questions have specific answers, although for some, more than one answer is possible. To receive full credit you must clearly and fully answer the question being asked. The points for each question are noted in parentheses totaling 100 points.

1. In 1950 for 14-24 year olds their were 98.2 males for every 100 females, but by 2004 for 14-24 there were 105.8 males for every 100 females.
Using rules one and two of Strong Inference answer the following question: What caused the change in male to female ratio in 14-24 year olds since 1950? (12 pts)
State multiple hypotheses and then at least one experiment to disprove the hypotheses. Example: Hypo's- More females are dying at a young age. Fewer males are dying at a young age. More males are being born. Fewer females are being born. Expt.- Look at demographic data to see if there is a difference in births. Look at death records to see if there is a difference in death rates.

2. Could an organism that is triploid, has chromosomes in triplicate, sexually reproduce? Why or why not? (10 pts)
No, it cannot complete meiosis. A set of three cannot be divided in equal halves to make haploid gametes.

3. To investigate the genetic and environmental influences on liking chocolate, you have tested chocolate preference in children born of four different sets of women. All of the children were the result of *in vitro* fertilization, and the different conditions are:
    A) Women who are related to their baby, but did **not** eat chocolate during their pregnancy.
    B) Women who are related to their baby, and did eat chocolate during their pregnancy.
    C) Women who are **not** related to their baby, but did **not** eat chocolate during their pregnancy.
    D) Women who are **not** related to their baby, and did eat chocolate during their pregnancy.
If liking chocolate is influenced by **both** genetic and environmental factors, and the environmental factors are due to exposure as a fetus, what would the results of your study be? Which women would give birth to children that liked chocolate? Why? (10 pts)
Because of the environmental influence, expect the children whose moms ate chocolate to prefer chocolate. But because of the genetic influence, expect the children related to their chocolate eating moms to like chocolate more.

4. Grouches need very specific conditions to incubate their eggs. The right conditions are rare, and there is competition between females to establish a nest in a location with the right conditions. How would this affect the relative sizes of male and female grouches? (10 pts)
Females would be as large or maybe larger than males. The females are competing for space, and the larger/aggressive will win and be able to reproduce.

5. A female calico cat that has both orange and black fur mates with an orange male cat. What is the chance that they will have a female orange kitten? (Show your work to receive partial credit.) (8 pts)
For females the chance is 50%. The male has one X with the O allele, and the females has two X's with O and B. All females have XX, and there is a 50% chance of a females with OB while the other 50% will be OO and orange.

6. You are searching for the location of three human genes. The genes are called Moe, Larry, and Curly. Between Moe and Curly you find 20% recombinants, between Moe and Larry you find 50%

recombinants, and between Larry and Curly you find 50% recombinants. Based on this information, where are these genes located in relation to each other? (Show your work to receive partial credit.) (10 pts)
Moe and Curly are 20 m.u. apart. Larry is on another chromosome. OR Moe and Curly are 20 m.u. apart, and Larry is very far, more than 50 m.u. from both.

7.   A couple went to a fertility clinic and gave birth to 20 offspring. They only took 10 of the children home and the other 10 children were adopted into another family. One of the parents has A blood type while the other has B blood type. The 10 children that live with them all have AB blood type. There are three other families with 10 children of the same age. In one family the children all have O blood type. In another family the children all have AB blood type. And in the third family half of the children have A blood type and the other half have B blood type. Which family adopted the couples 10 children? How do you know? (Show your work to receive partial credit.) (10 pts)
The parents are AA and BB which will give 100% AB offspring.

8.   Two moose with oval ears have 100 offspring. Their offspring have the following ear traits: 50 have oval ears, 25 have rectangular ears, and 25 have round ears. What are the genotypes of the parents, and how is ear shape inherited in moose? (Show your work to receive partial credit.) (10 pts)
The parents are both heterozygous, and ear shape is inherited via incomplete dominance or codominance.

9.   Genes X and Y are 35 map units apart. Genes Y and Z are 20 map units apart. You know that there are 20,000 nucleotides between genes Y and Z. Using this information, can you tell how many nucleotides are between genes X and Y? Why or why not? (10 pts)
No, crossing-over does not occur uniformly across the DNA. So the nucleotide and m.u. Relationship of one part of the DNA is not applicable to another part of the DNA.

10. Were the researchers that used this graph to conclude that stressful environments lead to sexual reproduction using proof or disproof to reach their conclusions? Why? (10 pts)
Proof. They ignored data points that did not agree with their interpretation and focused on the increase slope of the best-fit line that supported their idea.