Quiz 2
1. You have a long-haired female calico cat (lacking stripes in the BLACK pigmented fur) that is allowed to wander the neighborhood. The cat becomes pregnant and ultimately gives birth to a litter of six kittens with the following traits (it could be helpful to write the possible genotypes of the kittens):

KITTEN #1: A short-haired female calico with brown and orange fur (with stripes in the darkly pigmented fur)

KITTEN #2: A short-haired female albino kitten

KITTEN #3: A short-haired female kitten with stripes in the black pigmented fur

KITTEN #4: A long-haired male kitten with uniformly brown pigmentation

KITTEN #5: A long-haired Siamese male kitten with black pigmented fur (lacking stripes in the darkly pigmented fur)

(A). (5 points) Assuming that these kittens are the offspring of only a single father, what is the likely genotype of the MOTHER with respect to the following genes (if you are uncertain about any part of the genotype use a question mark)? Make sure to distinguish dominant alleles of the O and C genes with underlining.

C gene: C
A gene: aa
B gene: Bb

O gene: O
L gene: l

(B). (5 points) What is the likely genotype of the FATHER with respect to the following genes (if you are uncertain about any part of the genotype use a question mark)? Make sure to distinguish dominant alleles of the O and C genes with underlining.

C gene: C
A gene: A
B gene: b?

O gene: o
L gene: l

(C). (4 points) Which of the following male cats that are known to roam the neighborhood can you exclude as being the father (draw a line through those that you can exclude):

Short-haired brown pigmented striped coat pattern
2. (A) (3 points) You wish to obtain a long-haired striped brown tabby cat. Which of the kittens from problem 1 can be mated to **DEFINITIVELY** produce a long-haired striped brown cat (for this problem assume that the striped pattern in brown pigmented fur is a result of the action of the Agouti gene)?

**KITTEN#1 X KITTEN#4**

(point allocation for this problem is based on the genotype given for the father. Therefore, it was possible to get full credit, even if the father was genotyped incorrectly. Likewise, the answer may be correct according to the key, but points may have been taken off because the answer was wrong according to how the father was genotyped)

(B) (3 points) With what frequency will your desired long-haired brown striped cat arise from this mating? To ensure full credit, you should define the genotypes of the kittens used in this mating and show your work.

A long-haired brown striped cat would require the following genotype: C? bb A? oo ll

The probability of such a kitten from a mating of KITTEN#1 and KITTEN#2 would be equal to the products of the individual probabilities of obtaining this combination of alleles. The individual probabilities are as follows: C?: ¾  bb: 1  A?: ½  X°X° or X°Y: ½  ll: ½

So the overall probability = ¾ X 1 X ½ X ½ X ½ = 3/32
L – short  I – long  Cs - Siamese