MCDB 2150- S07 **Problem Set 1**, due **Thursday 1/25 – 11:55 PM**

You cross a true-breeding plant that has purple seeds and yellow leaves with another true-breeding plant that has green seeds and green leaves. All your F1 progeny have purple seeds and yellow leaves. Use standard nomenclature, and A/a to represent seed color and B/b to represent leaf color, to answer the following questions. (note-there is only one correct answer for each question.)

1. The dominant allele for seed color is:
   a. green
   b. yellow
   c. white
   d. purple

2. The genotype for the green seed-bearing parent is:
   a. AABB
   b. AAbb
   c. aaBB
   d. aabb
   e. AaBb

3. You cross the F1 progeny to itself. Gametes (egg and pollen) produced by the F1 progeny would include:
   a. Aa
   b. bb
   c. AB
   d. BB
   e. AA

4. The F2 progeny consists of plants with: purple seeds and yellow leaves; purple seeds and green leaves; green seeds and yellow leaves; green seeds and green leaves. The expected ratio of these classes in the order given is (look at the order carefully):
   a. 1:1:1:1
   b. 9:3:3:1
   c. 1:3:3:9
   d. 3:9:1:3
   e. 3:3:9:1

5. Another researcher repeats the above experiment, but did not first confirm that the parents are true breeding although they had the same phenotypes. The F1 progeny from this experiment all had yellow leaves but half of them had green seeds and the other half had purple seeds. What is the genotype of two parents used by this researcher?
   a. AABB, aabb
   b. AaBB, aabb
   c. AABb, aabb
   d. AaBb, aabb

6. A father displayed Huntington Disease, and 2 of his 3 children also have the disease, while the third child does not have the disease. Huntington Disease does arise from a dominant mutation, but can you draw that conclusion from this data?

a. No
b. Yes

7. What would be the phenotypes of the parents of the father in question 6 (grandparents of the children) that would **disprove** the assertion that Huntington Disease is a dominant trait?

a. Huntington, Huntington (parent 1, parent2)
b. Unaffected, Unaffected (parent 1, parent2)
c. Unaffected, Huntington (parent 1, parent2)
d. Huntington, Unaffected (parent 1, parent2)

8. The sister of the father in question 6 also had Huntington Disease, but neither of her children has the disease. What is the probability that her first grandchild (from either of her children with unaffected spouses) will have Huntington Disease?

a. 0
b. 1/4
c. 1/3
d. 1/2
e. 2/3
f. 3/4
g. 1

9. A couple has 3 children. One of the children is affected by Cystic Fibrosis disorder that does not affect the other siblings, or the parents or anyone else in the family. This leads you to conclude that the disorder arises from a recessive allele of the disease gene (which it does). What is the probability that an unaffected sibling is a carrier (heterozygous) for the disease allele?

a. 0
b. 1/4
c. 1/3
d. 1/2
e. 2/3
f. 3/4
g. 1

10. Since the family in question 9 has no other members with Cystic Fibrosis, we are going to assume that only one paternal and one maternal grandparent had the mutation. The affected child has many cousins who share one or the other set of grandparents. For any given cousin, what is his or her probability of being a carrier of the Cystic Fibrosis mutation? Assume that the "in laws" do not bring new alleles into the family.

a. 0
b. 1/4
c. 1/3
d. 1/2
e. 2/3
f. 3/4