

MCDB 2150- S03 **Problem set 1**, due **Thursday 1/26 – 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 green 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
  
5. Another researcher repeats the above experiment, but did not first confirm that the parents are true breeding. The F1 progeny from this experiment all had green 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. In the cross in Question 5, the investigator got 475 green seeded plants and 525 purple seeded plants. Using your answer to question 5 to create the hypothesis (or expected) class, what is the Chi-squared statistic for this data?
- 1250
  - 1.25
  - 2.5
  - 6.25
7. Having done the Chi-squared analysis, use Table 2.1 on page 36 of the textbook to determine if you should accept or reject the hypothesis.
- Accept
  - Reject
8. A couple has 3 children. One of the children is affected by a rare genetic 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. What is the probability that an unaffected sibling is a carrier (heterozygous) for the disease allele?
- 1/4
  - 2/3
  - 1/2
  - 1/3
9. A father displays wavy hair, and 2 of his 3 children have the same wavy hair while the third has straight hair. The wavy hair trait appears to be dominant, but can you be sure from this data?
- No
  - Yes
10. What would be the hair types of the parents of the father in question 9 that would disprove the assertion that wavy hair is a dominant trait?
- wavy, wavy (parent 1, parent2)
  - straight, straight (parent 1, parent2)
  - straight, wavy (parent 1, parent2)
  - wavy, straight (parent 1, parent2)