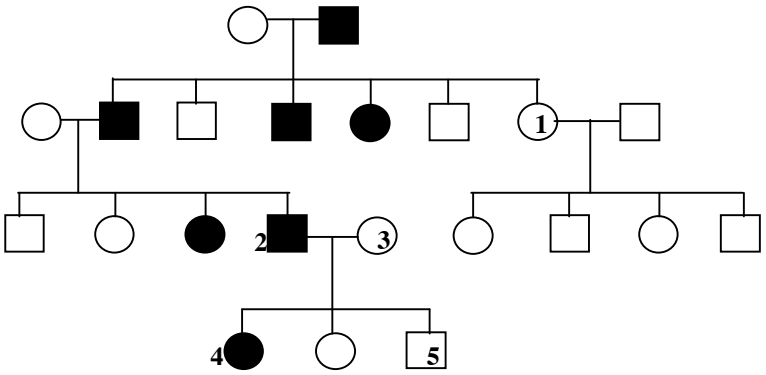
Practice Problems for Genetics, Session 3: Pedigrees

Question 1

In the following human pedigrees, the filled symbols represent the affected individuals. You may assume that the disease allele is rare and therefore individuals marrying into the family are unlikely to have defective allele.

a)



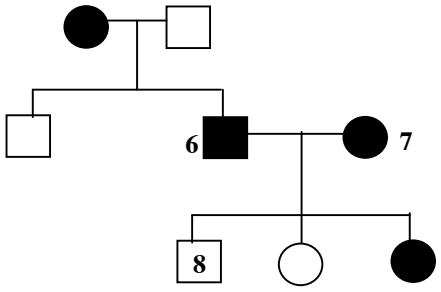
i) What is the most likely mode of inheritance for this pedigree?

ii) State the genotypes of individuals # 1-5 in the following table using the letter ”A”. Use the uppercase letter to represent the dominant allele and lowercase letter to represent the recessive allele.

Individual	Genotype
#1	
#3	
#4	
#5	

iii) If individuals # 2 and 3 have another son what are the chances that this son will be affected?

b)



i) What is the most likely mode of inheritance for this pedigree?

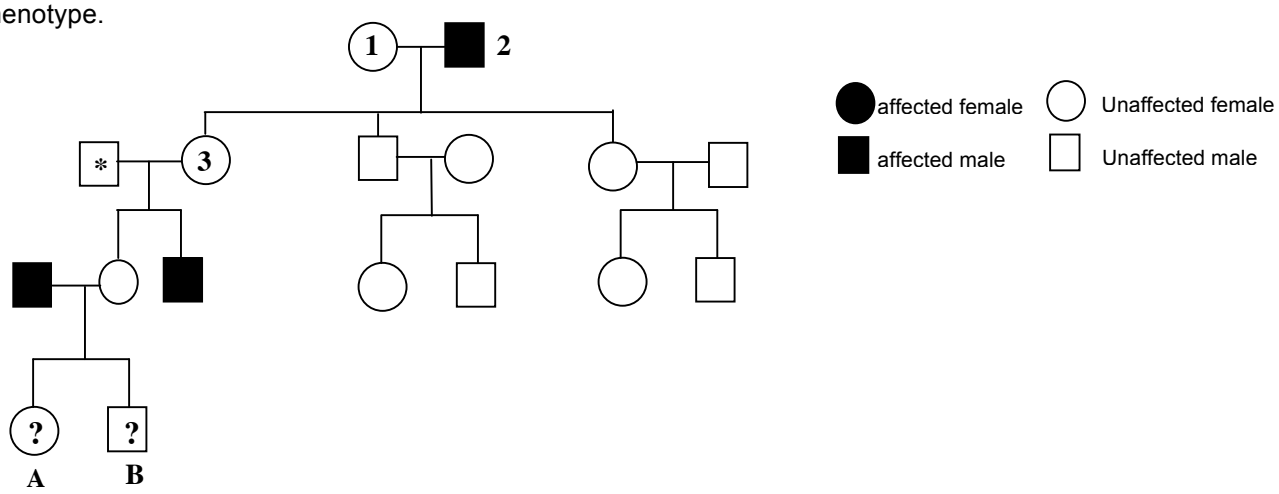
ii) State the genotypes of individuals # 6-8 in the following table using the letter ”B”. Use the uppercase letter to represent the dominant allele and lowercase letter to represent the recessive allele.

Individual	Genotype
#6	
#7	
#8	

iii) If Individuals #6 and #7 have another daughter what are the chances that she will be affected.

Question 2

You are analyzing the following human pedigree.
Assume that the individual marked with an asterisk (*) does not carry any allele associated with the affected phenotype and that no other mutation spontaneously occurs. Also assume complete penetrance. Use "R or X^R" for the allele associated with the dominant phenotype, "r or X^r" for the allele associated with the recessive phenotype.



a) What is the most likely mode of inheritance of this disease? Choose from: autosomal dominant, autosomal recessive, X-linked dominant, X-linked recessive.

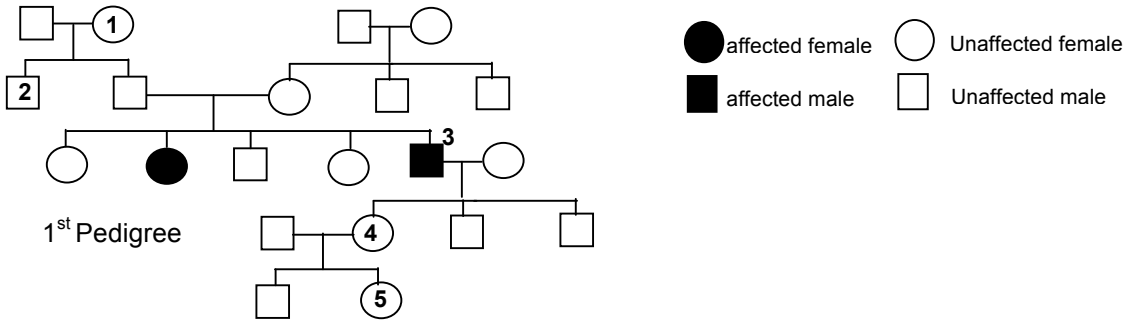
b) List all possible genotypes of the following individuals in the pedigree.

Individuals	Genotypes
#1	
#3	

c) What is the probability of Individual A being affected?

d) What is the probability of Individual B being affected?

Question 3
The following human pedigree shows a family affected by a specific disease.
Assume that the individuals marked with an asterisk (*) do not carry any allele associated with the affected phenotype and that no other mutation spontaneously occurs. Also assume complete penetrance



a) State the most likely mode of inheritance for this disease. Choose from: autosomal dominant, autosomal recessive, X-linked dominant, X-linked recessive.

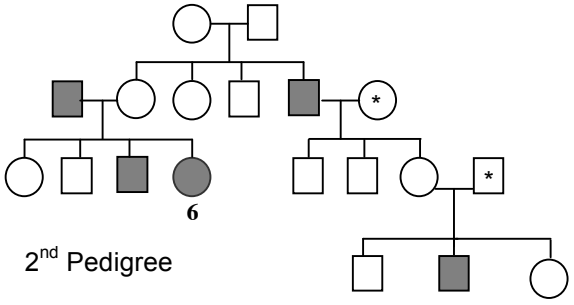
Question 3, continued

b) Write all possible genotypes of the following individuals in the pedigree. Use the uppercase "A" for the allele associated with the dominant phenotype and lowercase "a" for the allele associated with the recessive phenotype.

Individuals	All possible Genotypes
#1	
#2	
#4	

c) What is the probability that Individual 5 will be a carrier?

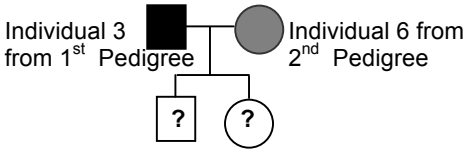
d) The following human pedigree shows a family affected by a different disease. Assume that the individuals marked with an asterisk (*) do not carry any allele associated with the affected phenotype and that no other mutation spontaneously occurs. Also assume complete penetrance. State the most likely mode of inheritance for this disease.



2nd Pedigree

Note: Use the notation such as "R or X^R" for the allele associated with the dominant phenotype and "r or X^R for the allele associated with the recessive phenotype.

e) Individual 3 from the 1st pedigree has a second marriage with Individual 6 from the 2nd pedigree. They have a son and a daughter as shown below.



i) What would be the genotype of their son for the two disease genes?

i) What would be the genotype of their daughter for the two disease genes?

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