BIOL3120 Problem set 4

1. A man with a certain disease marries an unaffected woman. They have eight children (four boys and four girls); all of the girls have their father's disease, but none of the boys do. What inheritance pattern is suggested?

a) X-linked recessive
b) X-linked dominant
c) Y-linked
d) Autosomal recessive
e) Autosomal dominant

2. A man with a certain disease marries an unaffected woman. They have eight children (four boys and four girls); all of the girls have their father's disease, but none of the boys do. What inheritance pattern are possible, no matter how unlikely?

f) X-linked recessive
g) X-linked dominant
h) Y-linked
i) Autosomal recessive
j) Autosomal dominant

3. A boy is detected to have XYY syndrome, ie has an extra copy of the Y chromosome. Non-disjunction in which parent, and during which meiotic division would lead to this condition?

a) Non-disjunction in the mother during meiosis 1
b) Non-disjunction in the mother during meiosis 2
c) Non-disjunction in the father during meiosis 1
d) Non-disjunction in the father during meiosis 2

This information relates to the following three questions:

ABO blood type is determined by one gene with three alleles: IA, IB, and i.

- IA and IB are codominant; someone with IA/IB genotype has blood type AB.
- IA and IB are dominant over i; someone with IA/i genotype has blood type A, someone with IB/i genotype has blood type B.
- i is recessive; someone with i/i genotype has blood type O.

Red-green colourblindness is caused by a mutation in a gene on the X chromosome, with an X-linked recessive inheritance pattern. The healthy allele is represented by XC, the mutated allele is represented by Xc.

A woman has blood type A and normal colour vision. She is in relationships with two different men. The first man has blood type AB and is colourblind, the second man has blood type A and normal colour vision.

4. The woman's first child is a boy, who has blood type O and is colourblind. Who is the father of this child?

a) The first man
b) The second man
c) Can't tell with this information

5. The woman's second child is a girl, with blood type B and normal colour vision. Who is the father of this girl?

a) The first man
b) The second man
c) Can't tell with this information

6. What is the mother's genotype for these two genes?

a) IA/IA XC/XC
b) IA/IA XC/Xc
c) IA/i XC/XC
d) IA/i XC/Xc
e) IA/IA Xc/Xc

7. A baby is born with an unknown disease, which is suspected to be genetic. A genetic test shows that the baby has uniparental disomy (UPD).

In maximum 4 sentences, briefly describe one way in which UPD could result in a genetic disease.