Exercises week 9 **Genetics**

Question 1

You cross 2 snapdragon plants :

Pollen taken from a short plant with red flowers is used to fertilize a tall plant with white flowers.

short

tall (normal size)

All F_1 (n=34) plants are tall with pink flowers.

By self-pollination F_1 plants produce F_2. Describe the phenotype of F_2 plants : size, flower color, relative proportions of each phenotype.

F_1

tall (normal size)

Assume
- R locus determines the flower color
- T locus determines the size
- these 2 loci are not genetically linked

Pink flowers in the F1 indicates incomplete dominance of red over white.
There are only 2 sizes (tall and short) : tall is completely dominant over short.

	tall (3/4)	tall red	3/16
	red (1/4)	short (1/4)	short red 1/16
	tall (3/4)	tall pink 3/8	6/16
F1 x F1	pink (1/2)	short (1/4)	short pink 1/8 2/16
	tall (3/4)	tall white	3/16
	white (1/4)	short (1/4)	short white 1/16

Question 2 :

A plant is allowed to self-pollinize. Planting the seeds obtained from this plant you observe

12 dwarf plants with white flowers

33 tall plants with white flowers

92 tall plants with red flowers

27 dwarf plants with red flower

The observation corresponds to the classical 9 : 3 : 3 : 1 Mendelian distribution

Dominance is complete because there is no pink flower, no intermediate size.

What is the genotype of the parental plant? _____ T/t C/c_____

What is the phenotype of the parental plant? ___ tall with red flowers ____

Locus T : T allele → tall ; t allele →dwarf

Locus C : C allele → red ; c allele → white

You let one of the 12 dwarf plants with white flowers self-pollinate.
Describe the phenotype(s) of the progeny with the relative proportion for each phenotype:

Genotype of the dwarf plant with white flowers : t/t c/c
Progeny : 100 % dwarf with white flowers

Question 3:
Adrian's karyotype is 47, XYY. The normal male genotype is 46, XY.

The chromosomal abnormality is due to

a. a nondisjunction during meiosis I in Adrian's father

b. a nondisjunction during meiosis II in Adrian's father

c. a nondisjunction during meiosis I in Adrian's mother

d. a nondisjunction during meiosis II in Adrian's mother

Adrian has 2 Y chromosomes instead of 1.
Adrian's mother does not have any Y chromosome; she cannot be the source of the abnormality.
The nondisjunction occurred in the paternal meiosis.
Meiosis I separates X from Y; so nondisjunction during meiosis I give XY sperm cells.
Only nondisjunction during meiosis II can give YY sperm cells.
Adrian mother transmitted X and Adrian's father transmitted YY