

**Exam / 2001**

$$\chi^2 = \sum \frac{(\text{obs.val.} - \text{exp.val.})^2}{\text{exp.val.}}$$

$$\text{probability} = \frac{n!}{w!x!} p^w q^x$$

**Pascal's triangle:**

**n:**

0							1							
1						1		1						
2					1		2		1					
3				1		3		3		1				
4			1		4		6		4		1			
5		1		5		10		10		5		1		
6	1		6		15		20		15		6		1	

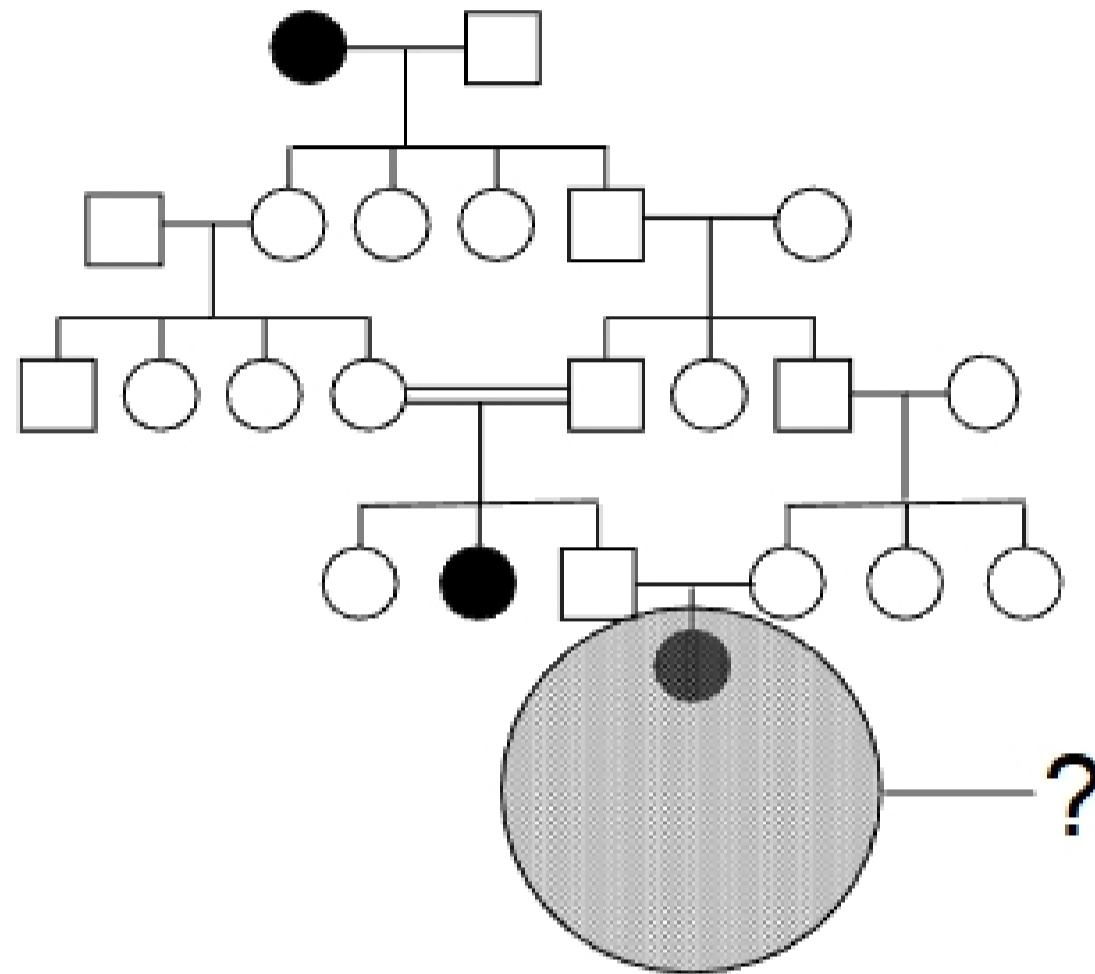
**Probabilities:**

df	0.90	0.50	0.10	0.05	0.01
1	0.016	0.46	2.71	3.84	6.64
2	0.21	1.39	4.61	5.99	9.25
3	0.58	2.37	6.25	7.82	11.35
4	1.06	3.36	7.78	9.49	13.28
5	1.61	4.35	9.24	11.07	15.09
6	2.20	5.35	10.65	12.59	16.81
7	2.83	6.35	12.02	14.07	18.48

CC =  $\frac{\text{observed doubles}}{\text{expected doubles}}$

I = 1 - CC

1. Given the pedigree below of a rare trait, answer the following questions.
  - a. What is the mode of inheritance? (5 pts.)
  - b. Fill in the genotypes of all individuals. (5 pts.)
  - c. If individual IV3 marries individual IV4, what is the probability that their first child would be an affected female? (10 pts.)



2. In the snail *Limnaea*, the direction of shell coiling is caused by a maternal effect.
  - a. What is a maternal effect? (5 points)
  - b. Recall that dextral coiling is dominant to sinistral coiling. A cross where the snail contributing the eggs was dextral, but of unknown genotype, was mated to a snail of unknown genotype and phenotype. All the F1 offspring exhibited dextral coiling. Ten F1 offspring were allowed to undergo self-fertilization. Five animals produced only dextrally coiled offspring, while the other five produced only sinistrally coiled offspring. What were the genotypes of the original parents? Show Punnetts or branching diagrams. (10 pts.)