

**Practical Problem Solving in Statistics**  
**13<sup>th</sup> International Symposium on Human Identification**  
**CFE Assessment**

Name \_\_\_\_\_

Institution \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ E-mail \_\_\_\_\_

Answers are in red.

1. The NRC II recommended formula for calculating a homozygote frequency is:

- a)  $p^2 - 2p(1-p)$
- b)  $p^2 - (1-p)\theta$
- c)  $p^2 + p(1-p)\theta$
- d)  $2p + p(1-p)\theta$

2. Probability is defined as:

- a) the frequency of an event in a large number of trials
- b) being more likely than not
- c) the posterior odds ratio
- d) the inverse of the odds

3. How many possible heterozygous types can there be with a locus that has four alleles?

- a) 4
- b) 6
- c) 10
- d) 1 minus the number of homozygotes

4. Calculations for related individuals:

- a) are conditional probabilities of a person with a given degree of relatedness having the identical genotype as the known genotype
- b) must use a  $\theta$  value of 0.05
- c) can only be applied to cases of alleged paternity
- d) all of the above

5. For a mixed DNA sample the exclusion probability is:

- a) 1 minus the heterozygote frequency
- b) the quantitative difference between the likelihood ratio and the random match probability
- c) probability of innocence
- d) combined frequencies of all genotypes that would be excluded from contributing to the mixed profile

6. A likelihood ratio is:  
\_\_\_ a) ratio of probability of paternity versus probability of non-paternity  
\_\_\_ **b) ratio of two conditional probabilities on mutually exclusive hypotheses**  
\_\_\_ c) ratio of nonexclusive probabilities on conditional hypotheses  
\_\_\_ d) ratio of two conditional probabilities on nonexclusive hypotheses
7. The genotype of the mother is BB, the genotype of her child is AB, and the genotype of the alleged father is AB. Let  $A=p$  and  $B=q$ . The likelihood ratio for this case is:  
\_\_\_ a)  $1/2(p+q)$   
\_\_\_ b)  $1/2q$   
\_\_\_ **c)  $1/2p$**   
\_\_\_ d)  $1/(p+q)$
8. Which statement is correct regarding a mixture calculation?  
\_\_\_ **a) The number of contributors is irrelevant for probability of exclusion**  
\_\_\_ b) The number of contributors is irrelevant in a likelihood ratio calculation  
\_\_\_ c) Allele frequencies are not considered for a probability of exclusion  
\_\_\_ d) There is a maximum number of loci that are allowable for a calculation
9. Bayes Theorem estimates:  
\_\_\_ a) the posterior odds by multiplying the prior odds with the probability of a match  
\_\_\_ **b) the posterior odds by multiplying the prior odds with the likelihood ratio**  
\_\_\_ c) the posterior odds by multiplying the prior odds with the probability of guilt  
\_\_\_ d) the posterior odds by multiplying the prior odds with the probability of paternity
10. The  $F_{ST}$  value describes:  
\_\_\_ a) the degree of departure from Hardy-Weinberg expectations  
\_\_\_ b) the degree of distortion of sample size  
\_\_\_ c) the degree of stochastic effects on a database  
\_\_\_ **d) the degree of relatedness within a population**