Part 1: BIO 201 End Semester Examination

Answer all the questions.

1. Which of the following is/are NOT a basic assumption of Hardy Weinberg 2 points
equilibrium? (2 marks)

○ Mating between individuals within the population is random.

○ The allele frequencies should be the same in the males and females.

○ Individuals should not vary in their fitness.

○ Populations should show discrete generations.

Heterochromia iridium is a recessive autosomal condition in humans in which the colour of the iris of one eye is different from the colour of the other eye. Consider that in a human population, in a survey of 5000 people, two people were found to have heterochromia. Also, consider that the population is at Hardy-Weinberg equilibrium at this locus. Based on this information, answer questions 2 and 3.

2. What is the frequency of the heterozygotes in the population? (1 Mark)   1 point

Please just write the numerical value.

Your answer

3. Assume that mating occurs at random with respect to this character.   2 points
What frequency of the matings in this population will be between heterozygous individuals and homozygous dominant individuals? (2 Marks)

Please just write the numerical value.

Your answer

4. In birds, z and w are the sex chromosomes. Females are heterogametic 2 points
with zw chromosomes while males are homogametic with zz
chromosomes. In chicken, a locus called barred is on the z chromosome.
A dominant allele at this locus (B) gives normal (wild type) feathers while
the recessive allele causes the feathers to have stripes of colours.
Consider a population of chicken which is at Hardy-Wienberg equilibrium
at this locus. A random sample of 1000 male chicken from this population
showed 400 individuals having feathers with stripes of colours. In a
random sample of 1000 female chicken from the same population, what is
the expected number of females with wild type feathers? (2 Marks)

Please just write the numerical value.

Your answer

Consider the following pedigree which shows a common genetic condition in
humans. In the population, the frequency of the dominant allele at this locus is
0.3. Based on this information, answer questions 5, 6, and 7.
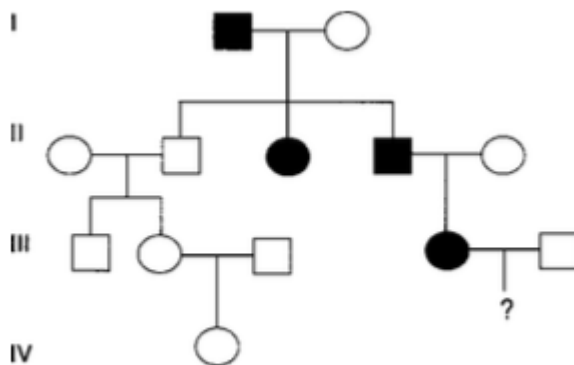
5. What is the mode of inheritance? (1 Mark)   1 point

○ Autosomal Recessive

○ Autosomal Dominant

○ X linked Recessive

○ X linked Dominant

6. What is the probability that IV-2 will have the condition? (1 Mark)   1 point
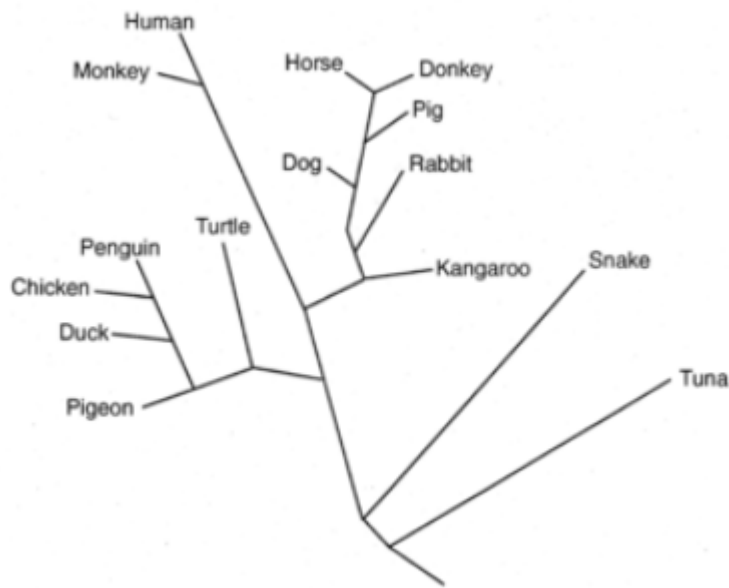
○ ¾

○ ½

○ ⅔

○ 0

○ ¼

○ 1

7. Suppose that IV-2 is unaffected and marries at random with respect to   2 points
this condition, what is the probability that their first child will have the
condition? (2 Marks)

○ 0.3

○ 0.7

○ 0.51

○ 0.021

○ 0.42

Consider the following phylogenetic tree and answer questions 8, 9, and 10.

8. According to this tree, dog is more closely related to which of these? (1   1 point
Mark)

○ Pig

○ Rabbit

○ Donkey

○ Kangaroo

9. This tree is: (2 Marks)   2 points

○ Rooted ultrametric tree

○ Not rooted but ultrametric

○ Rooted but not ultrametric

○ Neither rooted nor ultrametric

10. According to this tree: (2 Marks)

2 points

☐ Snake and tuna are most similar to the common ancestor

☐ The lineage of mammals (kangaroo, rabbit etc including human and monkey) have undergone speciation the most number of times

☐ Human and tuna share a common ancestor

☐ Turtle, penguin, chicken, duck and pigeon form a clade

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