MULTIPLE CHOICE.—For the following multiple choice questions circle the letter in front of the response that best answers the question or completes the sentence. (20 points, 2 points each)

1. Which of the following is NOT an assumption of scientific philosophy?
   a. Nothing in nature can be known with complete certainty.
   b. Sense experience reflects reality.
   c. There is order in the universe.
   d. Different events can have the same cause.
   e. None of the above. (All are assumptions of scientific philosophy)

2. When climbing a mountain, one observes changes in communities that are analogous to the changes one encounters when...
   a. a community evolves over time.
   b. at different depths in the ocean.
   c. in biomes at different latitudes.
   d. a community changes seasonally.
   e. from east to west across the U.S.

3. Which of the following biomes is noted for the presence of MANY large animals?
   a. Tropical Forest
   b. Temperate grassland
   c. Coniferous Forest
   d. Chapparal
   e. Taiga

4. Dinosaurs went extinct at the end of which Era?
   a. Paleozoic
   b. Cenozoic
   c. Mesozoic
   d. Precambrian
   e. None of the above

5. A shallow, nutrient-rich lake is called a(n) ________________________ lake.
   a. Benthic
   b. Eutrophic
   c. Pelagic
   d. Photic
   e. None of the above

6. Currently, what is the SECOND-most-important cause of species becoming extinct or endangered?
   a. Effects of exotic organism
   b. Recreational disturbance & overexploitation
   c. Commercial overexploitation
   d. Habitat destruction & alteration
   e. None of the above

7. Which of the following best describes a dung-eating organism?
   a. Ectoparasite
   b. Mutualist
   c. Parasitoid
   d. Predator
   e. Commensalist

8. In a population at Hardy-Weinberg equilibrium, if the frequency of \( a = 0.3 \), then what is the frequency of \( Aa \)?
   a. 0.09
   b. 0.21
   c. 0.50
   d. 0.70
   e. None of the above

9. Which of the following is a correct species name?
   a. \( Homo \ sapiens \)
   b. \( sapiens \)
   c. Sapiens
   d. \( Homo \ Sapiens \)
   e. None of the above

10. Which of the following is NOT an assumption of the Hardy-Weinberg theorem?
    a. No mutation
    b. No migration
    c. No random mating
    d. No natural selection
    e. None of the above (all are assumptions)
**MATCHING.**—For the following exercise match the exemplar organisms in the right column with the corresponding term in the left column. **Each letter may be used more than once or not at all.** (10 points, 2 pt. each)

1. Type I Survivorship _____  
2. Type II Survivorship _____  
3. Autotroph _____  
4. Exponential Population Growth _____  
5. Aposematic _____

A. Protozoans (amoebas etc.)  
B. Monarch Butterflies  
C. Humans  
D. Penguins  
E. Oak Trees

**FILL-IN-THE-BLANK.**—For the following exercises write the appropriate word or words in the available space. (20 points)

1. Fill in the missing ranks in the Linnean Classification. (4 points)

   **Kingdom**  
   __________________________  
   __________________________  
   __________________________  
   __________________________

   **Genus**  
   __________________________

   **Species**

2. Charles Darwin wrote his most famous book, __________________________, (2 pts.) in _________(year). (2 pts.)

3. Label the three zones of the ocean indicated in the figure below. (6 points)

   A. __________________________  
   B. __________________________  
   C. __________________________

4. Sketch and label a biomass pyramid for a typical terrestrial ecosystem. (6 points)
DEFINITIONS.—For the following words or phrases define them as accurately and concisely as possible. (20 points, 4 points each)

1. Science (be detailed in your answer):

2. Ecosystem:

3. Genetic Structure:

4. Permineralization:

5. Cladogenesis:

POPULATION PROBLEMS.—Complete the following problems using the appropriate equations. (10 points)

1. A population of 10000 individuals is growing **logistically** and has a yearly intrinsic rate of increase of 0.50. The carrying capacity is 20000. What is the **size** of this population after one year? After two years? After three years? (Be sure to write down any equations that you use.) (6 points)

2. This problem refers to a population that is at Hardy-Weinberg equilibrium. The gene being studied has two alleles represented by “N” and “n.” If the frequency of individuals with the genotype “nn” is 0.16, then what is the frequency of individuals with the heterozygote genotype (“Nn”)? (Be sure to write down any equations that you use.) (4 points)
SHORT ESSAYS.—For the following essays, address each question in as concise and lucid a manner as possible. Do NOT exceed the space provided. (20 points)

1. What causes seasons to occur? Be sure to explain why seasons are less pronounced in the tropics. (Feel free to include drawings to SUPPLEMENT your answer.) (10 points)

2. Compare and contrast natural selection and genetic drift? Explain how each works and what the results of each is. (12 points)