Multiple guess. (3 pts each, 30 pts total)

1. A p-value of 0.05 (P = 0.05) suggests [L]
   a) five percent of the variance is explained by the data.
   b) 95% of the variance is explained by the data.
   c) the null hypothesis is true.
   d) the null hypothesis is false.
   e) the null hypothesis is neither false nor true.

2. Forest stratification, described in the field guide, can be seen in the Arboretum when we [FG: 10]
   a) look at the different types of soils found under grassy areas to forested areas.
   b) encounter animal damage to plants.
   c) see that areas are either open or forested.
   d) see levels of vegetation within a forest, including herbs, shrubs, and trees.
   e) do something entirely different (none of the above).

3. Seasons on the Earth are unaffected by which of the following? [L]
   a) Tilt of the Earth’s axis.
   b) Rotation of the Earth in a prograde fashion different than once per year.
   c) Distance of the Earth from the sun (its orbit being elliptical).
   d) Revolution of the Earth around the sun.
   e) All of the above (interpretation = choose this if you believe none of the above has an effect on seasons).

4. The intertropical convergence zone is responsible for [L, TB:76]
   a) the heavy rains found in the tropics.
   b) the snows that occur at or near the poles.
   c) the droughts that occur at 30 degrees north and south latitudes.
   d) all of the above.
   e) none of the above.

5. Sustainable development, as described in your reading for the first lecture and from the activities that took place at the World Summit in Johannesburg, South Africa, is the idea that [L, web reading]
   a) ecological systems are sustainable even with the development patterns currently seen in human populations.
   b) human activity should not diminish the prospects for future generations.
   c) the development of human services should keep pace with growing populations.
   d) all of the above.
   e) none of the above.

6. Continental plates move around the surface of the Earth because [L, TB:464]
   a) they have nothing better to do. Sitting still is boring.
   b) of the centrifugal force of the spinning Earth.
   c) winds and ocean currents push on them.
   d) all of the above are responsible for causing plates to move.
   e) none of the above.
7. The “tragedy of the commons” [L]
   a) results from cheaters abusing commonly owned resources.
   b) was an off-Broadway play about ecological problems in upstate New York.
   c) use to take place in areas like the Boston Commons but is now largely absent due to governmental regulations.
   d) all of the above.
   e) none of the above.

8. Phil Grime suggest a theory that divides plant life history strategies into three categories. Match the following strategies on the left with their characteristics on the right using hand-drawn lines. [L, TB: 206-7]

<table>
<thead>
<tr>
<th>Competitors</th>
<th>Reproduce relatively late, few seeds produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruderals</td>
<td>Few seeds, vegetative spread important</td>
</tr>
<tr>
<td>Stress Tolerators</td>
<td>High reproductive rate, high growth rate</td>
</tr>
</tbody>
</table>

9. Cole’s Paradox suggests that [L, see TB:212]
   a) the number of species in an area cannot exceed the number of resources found there.
   b) plants are limited by herbivores only when predators are present.
   c) semelparous plants need only produce one extra seed to equal the strategy of iterparous plants.
   d) iteroparous plants need only produce one extra seed to equal the strategy of semelparous plants.
   e) life simply should not exist on Earth.

10. Male peacocks appear to have evolved elaborate tail feathers to [TB: 220, and L]
   a) attract females.
   b) intimidate other males.
   c) reduce parasite loads.
   d) all of the above.
   e) none of the above.

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Short-answers. Write legibly. Use ONLY the space provided. Answers should be succinct - no brain dumps. Graphs should include axis labels. Choose 4. (5 pts each, 25 pts total)

1. During our visit to the Arboretum I discussed many adaptations of organisms. Please describe one of these (reward for coming and paying attention). [L].
2. Draw the location of the desert biome in a graph depicting climate where the axes divide climate between annual precipitation (y-axis) and temperature (x-axis). [L, TB:105]

3. What’s the difference between central tendency and dispersion? Discuss how we might be interested in these if we do an experiment to investigate the effects of fertilization on plant growth rate. [L]

4. What are models used for in ecology? [L]
5. Draw a graph of the relationship between the numbers of individuals in a population and an environmental factor that is important to the species (e.g., a water availability gradient). Discuss the parts of your graph. [L, TB: 184]

6. What’s the difference between science and religion, as discussed in lecture? [L]

7. Please explain the Hardy-Weinberg Law (or Equilibrium) and why it is significant to the science of ecology.
Mandatory short-answer questions (10 pts each, 40 pts total).

1. What is ecology? Please provide a definition and why it’s important for biology majors to study this field.

2. Discuss two principles of ecology suggested in this graph. Try to be specific regarding what these data represent.
3. Discuss what is meant by a “genotype by environment interaction” for the trait plant height. How would you determine that there is such an interaction? Hint: identify the experimental approach – do not outline the entire experimental protocol. Finally, provide a graph of such a relationship. [L, TB:203]

4. What are the four easily observed characteristics of natural selection? [L]
   1. ______________________________________________________
   2. ______________________________________________________
   3. ______________________________________________________
   4. ______________________________________________________