BIO 160 PRACTICE QUESTIONS FOR EXAM #1

PLEASE READ THIS FIRST: The practice questions below are taken from past exams and are a blend of multiple choice and short answer essay. The questions on your exam this semester will be different in that they will be entirely multiple choice with your answers marked on a scantron sheet. As a result, although similar topics will be covered, the format of the questions on your exam will not match that of the questions below. Please take this into account when studying from these sample questions.

1. Refer to the diagram below to answer the following questions about global climate.

   ![Diagram of Hadley Cells]

   A) Which letter represents the location where the circulating air has the highest moisture content?  
   A B C D E (CIRCLE ONE)

   B) Which letter represents the location on the ground where precipitation on the ground is highest?  
   A B C D E (CIRCLE ONE)

   C) Which letter represents the location on the ground where the air is driest?  
   A B C D E (CIRCLE ONE)

   D) What is the temperature and moisture status of the air at point B?  
   Warm/dry Warm/wet Cold/dry Cold/wet (CIRCLE ONE)

2. You decide to create a new mountain range that extends north-south directly along the coast of California and reaches heights of up to 10,000 ft. in elevation.

   Assuming that the weather originates in the Pacific ocean and moves from west to east over the new mountain range, you expect the annual precipitation of a location east of this mountain range to (CIRCLE ONE):
   
   Increase Decrease Stay the same

   Explain in 2 sentences or less.
   Moist air from the ocean moving east across the mountain range would rise and cool, causing it to lose moisture over the western slope of the range. The air passing over the mountain toward the east would lose its moisture and become very dry, resulting in decreased precipitation on the east (rainshadow) side of the range.
3. In an El Niño year, climate & ocean conditions in the eastern and western Pacific Ocean can shift dramatically from their normal (non-El Niño) conditions. For each factor below, explain how (in a single sentence each) that factor is affected in an El Niño year along the coast of California.

<table>
<thead>
<tr>
<th>Air temperature</th>
<th>warmer</th>
<th>cooler</th>
<th>same</th>
<th>Precipitation</th>
<th>wetter</th>
<th>drier</th>
<th>same</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warmer because relaxing trade winds allow warm air to back up or stay in the eastern Pacific Ocean.</td>
<td>Wetter because relaxing trade winds allow moist air to back up or stay in the eastern Pacific Ocean.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ocean nutrients</th>
<th>higher</th>
<th>lower</th>
<th>same</th>
<th>Ocean life</th>
<th>abundant</th>
<th>rare</th>
<th>same</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower because nutrient rich water supplied from upwelling will decrease.</td>
<td>Rare because of reduced delivery of nutrients due to less upwelling.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Match the letter of the word or phrase on the right with the word or phrase on the left with which it is most closely associated. Answers may only be used once.

| ____E____ | allopatric speciation | A. | small population size |
| ____G____ | Hardy-Weinberg equilibrium | B. | water balance |
| ____H____ | Coriolis effect | C. | directional selection |
| ____D____ | r-selected | D. | variable environment |
| ____C____ | peppered moth | E. | geographic barrier to gene flow |
| ____A____ | genetic drift | F. | adiabatic cooling |
| ____J____ | K-selected | G. | large population size |
| ____F____ | Hadley cell | H. | ocean circulation |
|                    | I. | disruptive selection |
|                    | J. | few offspring |

5. Due to a severe storm, a small number of bats from a large mainland population are blown far out to sea and establish a brand new population on a small island that differs from the mainland in its habitat conditions. Answer the following questions regarding this population.

a) What is this phenomenon called? ____founder effect____

b) In a single sentence, explain how the level of genetic variation in the new island population will compare to that of the mainland population.

Higher | Lower | Same | Can’t tell (CIRCLE ONE)

In a single sentence, explain your answer.
Because very few individuals founded the island population in the first place, only a small subset of the original genetic variability in the mainland population can exist in this population.

C) Is the island population of bats more vulnerable to extinction than the mainland population?

Yes | No | Can’t tell (CIRCLE ONE)

In 2 sentences or less, explain your answer.
It will be more vulnerable to extinction because chance events can eliminate small populations and low genetic variability reduces the ability of such populations to respond to changes in the environment [e.g., climate changes, introduction of disease].
d) Given enough time, is speciation likely to occur in this situation?  
  
Yes  No  Can’t tell  (CIRCLE ONE)  

In 2 sentences or less, explain your answer. Be sure to use appropriate terms in your answer.  
It is likely because the island population is cut off from gene flow [or reproductively isolated]  
from the mainland population by a geographic barrier (ocean). This allows the two populations  
to adapt to local conditions and diverge genetically to the point that they can no longer  
terribred.  

6. The following are Darwin’s four postulates. Fill in the correct missing word(s).  

If organisms _vary_;  
If some of this variability is __heritable__;  
If organisms produce more offspring than survive;  
If some survivors are better __suited__ to their environment than others;  
Then, organisms with _favorable/maladaptive_ traits will tend to _accumulate/decline_ in the  
population.  

7. Two plant species co-occur in an oak savanna. One is fairly long-lived and produces few large seeds  
(Species A). The other is short-lived and produces many small seeds (Species B).  

a) In 2 sentences or less, compare and contrast the advantages and disadvantages of these two life  
histories. For species A, its large seeds have lots of food reserves to enhance competitive ability  
but low dispersal potential. For species B, its small seeds have high dispersal potential but few  
food reserves to enhance competitive ability.  

b) Which species is most likely an r-selected and which species is most likely a K-selected species?  

| r-selected: | Species A | Species B | (CIRCLE ONE) |  
| K-selected: | Species A | Species B | (CIRCLE ONE) |  

c) In the box at right, draw a graph showing how  
population size would vary over time for a typical  
r-selected species.  

[Graph showing population size (N) over time]  


d) In a single sentence, explain why you drew the graph you did.  
Because r-selected species evolved to utilize resources that are periodic or ephemeral in their  
availability, population size should fluctuate in an up and down or "boom and bust" pattern  
corresponding to the temporary availability of those resources.