Dr. Reichler's Bio 301M Exam #3 July 9, 2008   Print Name:_ KEY_____

Read each question carefully and don't hesitate to ask if a question seems unclear. If possible, answer each question in the space provided, but if needed, continue on the back. If you use a drawing as part of your answer, be sure to also include a written explanation. These questions have specific answers, although for some, more than one answer is possible. To receive full credit you must clearly and fully answer the question being asked. The points for each question are noted in parentheses totaling 103 points.

1.   What trait might we want in plants so that agriculture can be more efficient as global climate change becomes more drastic? How would this trait help make agriculture more efficient as the climate changes? (8 pts)
Any of: Drought or flood resistant to overcome changes in precipitation. Heat tolerant to deal with warmer temperatures. Insect resistant to deal with increased bugs due to increased rainfall and temp.

2.   You are studying levels of carbon dioxide (CO_2) in the atmosphere from 3,000 years ago. You take a measurement from a location, and you find that the CO_2 is significantly <u>lower</u> than other areas measured at the same time. Your measurement is accurate. What could explain this <u>lower</u>, local, CO_2 level? (8 pts)
This measurement was taken in an area with many plants that were using the CO2 for photosynthesis.

3.   Other than directly using less energy (turning off lights, driving less, etc), what could you do to reduce atmospheric carbon dioxide (CO_2) levels? (8 pts)
Eat less meat. Increasing the efficiency of energy use and delivery.

4.   What is one problem with "growing" our energy by using biofuels? (8 pts)
Any of: Lignin removal. Competition between crops grown for food and fuel.

5.   You find some information about the minimum number of a species necessary for their long-term survival. Would you expect that number to be the same in the future? Why or why not? (8 pts)
It depends on changes in the environment. If we are looking at the number to keep them out of an extinction vortex, that may not change much because X number of individuals will always have X amount of genetic diversity. But as change becomes more rapid, they may need more genetic diversity, and therefore more individuals. Also, if we are looking at the number to perform an ecosystem function or for human use, climate change may change their interactions with other species, and therefore the number needed to provide this function.

6.   Seattle, Washington receives about the same about of annual precipitation as Austin, Texas. Austin receives hard rain occasionally, while Seattle gets light rain over many days. Urban waterways in which city would derive the <u>greater</u> benefit from the addition of retention ponds and/or baffle boxes to their storm sewer system? Why? (10 pts)
Austin. Consistent light rain should not have the problems of too much or too little water in the waterways. But Austin with it's extreme fluctuations in precipitation needs these systems to help even out water distribution to the waterways.

7. How might some of the new designs for urban storm sewers help decrease the amount of plastic in the ocean? (8 pts)
By filtering out plastic before it reaches waterways.

8. Could you produce herbicide resistant plants by artificial selection (breeding)? Why or why not? (8 pts)
No. Artificial selection only works on traits existing in the species. It cannot introduce new traits.

9. If two species went extinct yesterday. One that was important for ecotourism and one that served a critical ecosystem function. The extinction of which species would be most economically costly? Why? (10 pts)
Ecosystem functions of a species cover a wide spatial and temporal distribution. In many cases we do not have the technology to replace these functions and/or the technology to cover such a wide spatial/temporal distribution would be prohibitively expensive.

10. Why is it important to know how an animal acts when it sees other individuals of its species when using the mirror test to check for self-awareness? (8 pts)
They may not recognize themselves in the mirror but see themselves as another individual. By seeing if they behave differently in front of a mirror versus in front of other individuals can help determine if they have a sense of self.

11. Predict how rising atmospheric carbon dioxide (CO_2) levels might change the reaction of a plant's stomata to <u>other</u> stimuli? Additionally, what is the connection between increased carbon dioxide (CO_2) levels and stomata opening and closing? (8 pts)
The stomata will not need to be open as often. Open stomata allow plants to take in CO2, but they lose water. With more CO2, the plant can conserve water and still get enough CO2.

12. Why might altering an individual's perspective on their local environment allow you to manipulate an emergent, self-organizing, system? (8 pts)
Each individual is making decisions based on their perception of the conditions. By changing that perception, we can manipulate their decision.

Bonus: What evidence indicates that competition for resources is a root cause of the conflict in Darfur? (3 pts)
Many of the different groups lived in harmony and interdependence for years before the resources decreased. Also, the conflict intensified as resources became scarce.