Dr. Reichler's Bio 301L Exam #1 July 23, 2009 Print Name: KEY

1. Using rules one and two of Strong Inference answer the following question: What causes diabetes? (12 pts)
Should have 2 or more hypotheses and at least one experiment that can disprove the hypotheses. Ex. Diabetes is caused by eating to much sugar. Diabetes is caused by eating too little sugar. Expt. Feed some people mostly sugar, feed others almost no sugar, and see who develops diabetes.

2. By changing (a substitution) **three** nucleotides in the coding region of a gene, what is the minimum and maximum number of amino acids that would be changed? Explain. (10 pts)
Min- 0, with redundancy in the genetic code, 3 nucleotides could be changed in 3 different codons but still code for the same amino acids. 3/5 points for 1, if you change 3 nucleotides of 1 codon you will change 1 amino acid. Max- 3, by changing 3 nucleotides in 3 codons you can change 3 amino acids.

3. Compare one of the perspectives of genes to one of the characteristics that define life. Describe how they are similar. (10 pts)
Any of: Genes code for proteins, and proteins allow life to have metabolism and respond to the environment. Genes are replicators, and that is one of the key definitions of life. Genes act as switches, and life must be able to grow and develop.

4. If BPA (one of the chemicals in some plastic) has adverse affects in rats, is this a reliable indicator that BPA is dangerous to humans? Why or why not? (10 pts)
No, chemicals have different affects and at different levels in different species.

5. How can a temperature of 4°C (about 40° F) kill a cell, and how could a cell avoid dying at this temperature? (10 pts)
The membranes may solidify/freeze causing holes in the membrane. By adding unsaturated lipids the cell can decrease the freezing point of its lipids.

6. Hemoglobin, a protein, is normally produced in red blood cells. If you wanted hemoglobin produced in the nerve cells in your brain, what part(s) of the gene would you need to change, and what part(s) of the gene would you keep the same? Explain. (10 pts)
The promoter needs to change so the gene will be expressed in the new cells. The coding region needs to stay the same so the same protein is produced.

7. If a woman began smoking in the last trimester of her pregnancy, would you expect her child to have a greater chance of obesity as an adult? Why or why not? (10 pts)
No, the greatest effects are during the first trimester.

8. If you want to treat a disease using stem cells, why are adult stem cells less useful than embryonic stem cells? (8 pts)
Adult stem cells are pluripotent so they can only be used to produce some cell types. So you cannot produce new cells from a tissue with few or no adult stem cells.

9. If fraternal twins that grew up together had a 90% chance of having the same favorite color, and identical twins that grew up in different families had a 50% chance of having the same favorite color, would this indicate a stronger environmental or genetic influence on color preference. Why? (10 pts)
Environmental. The fraternal twins have fewer genetic similarities, but in this case share an environment, and they have a higher chance of liking the same color.

10. This graph shows the number of bald eagle nesting pairs in Florida from 1973 to 2007. If DDT use was halted in 1972, why do majors gains in the number of eagles not occur until after 1988? (10 pts)
DDT caused fragile egg syndrome, so the adults had few effects, but few eggs hatched. It took several years for enough new eagles to be born without DDT, so they could lay healthy eggs.