Dr. Reichler's Bio 301L Exam #3 August 14, 2009 Print Name: KEY

1. A field has 1000 plants, 100 herbivores, and 10 carnivores. If the number of plants decreases to 300, would you expect a greater reduction in the number of carnivores or herbivores? Why? (10 pts)
Either: Greater percent of carnivores because since they are further from the producers, the reduction in energy will be more strongly felt. Greater number of herbivores because there are more herbivores to start with, less plants will mean less energy for the herbivores.

2. Would a monogamous or non-monogamous male have a greater increase in longevity by adhering to a calorie restriction diet? Why? (10 pts)
A monogamous male puts more energy into reproduction; they help raise the offspring. One of the benefits of CR diet is a reduction in reproduction that increases lifespan. Monogamous males put more energy into reproduction and therefore would benefit more by reducing their reproduction via CR.

3. When farmers use pesticides to kill insects, the pesticides kill both the harmful insects (that eat the crops) and beneficial insects (that do not eat the crops). Would using genetic engineering to make crops that produce the BT toxin be more or less likely to harm the beneficial insect? Why?(10 pts)
While genetic modifications can spread during plant reproduction, if the beneficial insects are not eating the GM plants, they should not be affected. Chemicals can spread through the air and water and so have a greater chance of having non-specific effects.

4. You are performing a dissection on a cadaver, and you cut open a large blood vessel. Without tracing it back the the heart, how could you identify whether it is an artery or a vein? (10 pts)
Veins have one-way valves, arteries do not.

5. There is plentiful water underground and a plant has its stomata open, but the plant cannot supply enough water to its leaves. Why? (10 pts)
Sufficient water transport is dependent on having enough xylem to supply all of the leaves. This plant has more leaves than the xylem can deliver water to.

6. Would 100 kg of a woody plant or 100 kg of a non-woody plant yield more biofuel? Why? (10 pts)
The woody plant has more xylem, and xylem has more cellulose, and cellulose is used to make ethanol.

7. When people dream about running, the parts of the brain that control the legs are active. Does this make the 'dreams are rehearsal' or 'dreams are random' hypothesis more likely? Why? (10 pts)
Since the same brain areas light up when doing something or when dreaming about something, this supports the 'dreams are rehearsal' hypothesis. If dreams were due to random brain activity, you would not expect a connection between the dream and the part of the brain that is active.

8. Why is phytochrome sensitive to both red and far-red light? What does each type of light tell the plant? (10 pts)
Far-red light is prevalent in the shade of other plants while red light is prevalent in direct sun. The light, red or far-red, that the plant perceives tells it whether it can do much photosynthesis or not.

9. What trait could you genetically engineer into people that would allow them to obtain more nutrients when they eat plants? Why would this trait allow people to obtain more nutrients from eating plants? (10 pts)
The ability to breakdown cellulose. We cannot digest cellulose to get the sugars.

10. What could a single patrol ant do to trick the forager ants into leaving the nest? What would the patrol ant do, and why would this cause the forager ants to leave the nest? (10 pts)
Forager ants look a the rate of patrol ant return. The patrol ant could go in and out of the nest multiple times to make it seem like many patrol ants were returning.