Exam II

Name__________________________ TA’s Name________________

Total = 100 points

1 (20 points) __________
2 (20 points) __________
3 (14 points) __________
4 (10 points) __________
5 (12 points) __________
6 (24 points) __________

There are 4 pages and 8 questions.

To receive full credit for numerical problems, show your calculations and give the correct units for your answer. Partial credit will be given, so try to provide an answer for all questions.

1a. Describe two general mechanisms that might account for the fact that there are more species of ants living in Vermont forests than in adjacent bogs and wetlands. (10 points)

1b. Describe a field experiment that could be conducted which would distinguish between these two mechanisms. (5 points)

1c. Describe the possible outcomes of your experiment and explain how they would tend to support or refute each of your hypotheses. (5 points)
2. You are studying competition between red and black desert scorpions. For the red scorpion, $K_1 = 100$ and $\alpha = 1.33$. For the black scorpion, $K_2 = 50$ and $\beta = 1.0$.

Suppose the initial population sizes are 100 red scorpions and 100 black scorpions. Plot these initial population sizes. Graph the state space and isoclines for each species, and the trajectories of population change. Be sure you label both axes and indicate the values at which each isocline crosses the $x$ or $y$ axis. (15 points) Predict the short-term dynamics of each population and predict the final outcome of interspecific competition. (5 points)

3. List the assumptions of the Lotka-Volterra predation model. What determines the period and the amplitude of the cycles in the predator-prey model? (14 points)
4. In the space below, draw the space state diagram for the predation-prey equations. Be sure to carefully indicate the predator and prey isoclines and to fully label each axis. Draw the trajectory that is traced by the predator and prey populations in this model (10 points)

5. Explain two mechanisms that might lead to the evolution of iteroparity. What kind of experiment or data could you collect that would allow you to distinguish between these two mechanisms? (12 points)
6. Define or explain the following terms (3 points each):

metapopulation

competition coefficient (beta (β))

allopatric

keystone species

hare-lynx cycle

bottom-up control

conversion efficiency

unstable equilibrium