1. Define: (3 pts each)
   A. scotophil period
   B. crepuscular
   C. entrainment
   D. trophallaxis
   E. “per” gene

2. Using the Wiltschko model for the use of the Earth’s magnetic field for compass information, tell what would happen to an organism’s orientation in the following magnetic experiments and why?
   A. The horizontal component of the magnetic field around a migrating organism is rotated to the right by 120 degrees. (10 pts)
   B. The vertical component for a northern hemisphere migrant is changed such that the north end of the magnetic field, instead of pointing 60º downward, now points only 20º downward. (10 pts)

3. Distinguish between types I, II, and III orientation abilities. Why is type I alone not sufficient for migrating organisms? Describe one set of results that show that type I orientation is low in priority even when it can be used. (20 pts)

4. Describe the sequence of forager communication of food location in stingless bees that might give some inference as to how the complex dance communication of honeybees historically evolved. (26 pts)

5. We put an organism into an environment where all controllable conditions are held constant for 1 year. In those conditions the organism still goes through its annual behavioral cycles on a 365 day basis. Have we shown that the organism possesses a circannual rhythm? Why or why not? How would you alter the experiment in order to more confidently show whether or not the organism has a circannual clock? (19 pts)