Exam I

Please place your name and P.O. Box on the last page. Your answers will be graded both on whether you answer the question accurately and how clearly (and concisely) you answer it. You needn’t fill the entire side to answer each question well! You may not use more than one side. Finally, if you don’t understand the question, write me a note to indicate this, but try to answer it anyway.

1. In the “Origin,” Darwin often writes of natural selection as an ‘entity’ or force leading to improvement of organisms:

   It may be said that natural selection is daily and hourly scrutinising, throughout the world, every variation, even the slightest; rejecting that which is bad, preserving and adding up all that is good; silently and insensibly working, whenever and wherever opportunity offers, at the improvement of each organic being in relation to its organic and inorganic conditions of life. (Chapt. 4)

Using examples that we have considered in class (or others that you know of), argue for or against this metaphorical usage. (20 pts.)
2. Several species of *Enallagma* damselflies have two color morphs. Some females are drab gray, as are all females in most species, while others have the bright blue coloration typical of males. Describe a set of observations that would test whether these morphs constitute two strategies at an evolutionary stable state (i.e. at equilibrium). (20 pts.)
3. Describe three distinct reasons why optimality models may not accurately predict the phenotype of individuals in a population, using an example to illustrate each reason. (20 pts.)
4. I hypothesize that honeybees have a mutualistic relationship with *Solidago rigida* at Krumm. Describe a set of observations and/or experiments that would demonstrate that their relationship is mutualistic. What sort of data would I need to gather to determine whether this interaction was a result of coevolution? (20 pts.)
5. Interpret the following figure from your textbook. First, contrast the top and bottom graphs. Second, explain what we can infer about evolution of age at maturity (a life-history trait) in eutherian mammal. Finally, describe two distinct problems with using such data to evaluate adaptive changes in age of maturity. (20 pts.)
Name ________________
P.O. Box ______________