

BIO4AE3 midterm test, 19 October 2023

Please write your name on every page you use (1 point).

1 Definitions (15 points)

Define five out of six in a phrase or sentence.

- a. incidence b. encounter filter c. parasitoid
d. seroprevalence e. symbiont f. (evolutionary) cheater

1.

2.

3.

4.

5.

2 Short answers (24 points)

Answer 4 out of 5 in a few sentences. Feel free to draw diagrams where appropriate.

- a. Why would you expect host extinction to be more likely to be caused by a parasite with density-dependent transmission than by one with frequency-dependent transmission?
- b. Name three kinds of data that could be used to estimate $\mathcal{R}_0$.

- c. How do reservoir hosts allow a parasite to drive hosts extinct when simple models predict that parasites should always go extinct before their hosts?
- d. What is the difference between a critical community size (stochastic threshold) and a density threshold for disease extinction for a parasite with density-dependent transmission?
- e. What is (parasite-mediated) apparent competition and how does it work?

1.

2.

3.

4.

3 Essays (60 points)

Answer *two out of three*: allocate about 10 minutes to each. Take a few minutes before you start writing to think about the organization of your answer and what points you're going to cover. Use examples and/or diagrams to illustrate your answers where appropriate.

- a. Explain the concept of **levels of selection** in evolution. Use at least two examples from host-parasite systems to illustrate how it works.
- b. Discuss the roles of theoretical (model-based), lab experiments, field experiments, and observational data in understanding ecological and evolutionary

systems. What are the costs/benefits or advantages/disadvantages of each kind of information? Give at least one example of each level of information and how it applies to our knowledge of a particular host-parasite system; for at least one system, contrast the contribution of two different levels.

- c. Compare and contrast population cycles in parasite *prevalence* in a constant or slowly changing host population with population cycles in the *size* (density or number) of a host population. Explain how each works, using diagrams or equations if it helps you explain clearly. Give at least one example (include some information about the example beyond just the names of the parasite and the host).

