

MONT 103N – Analyzing Environmental Data  
Midterm Examination – March 30, 2012

Your Name: \_\_\_\_\_

*Directions:* Do all work on these sheets. You may use the back if necessary, but please alert me with a note if you do. In a case where a later part of a question depends on a previous part, I will give credit for the later part as long as you have a correct approach, even without the correct value from the previous part. There are 100 points, distributed as indicated in the questions.

I. In the absence of any natural predators, the population in month  $n$ , denoted  $u(n)$ , of a fast-reproducing species of fruit flies satisfies the logistic difference equation:

$$u(n) = 2.3u(n-1) - \frac{1.3}{300} \cdot (u(n-1))^2$$

A) (10) If  $u(0) = 100$ , what are  $u(1)$  and  $u(2)$ ?

B) (10) Now suppose that birds living in the same habitat kill and eat 50% of the fruit fly population present in each month. How could the model be adjusted to take this into account?

C) (5) What are the equilibrium fruit fly populations for your adjusted model in part B?

II. All parts of this question refer to the following data set:

17, 18, 19, 26, 27, 29, 38, 41, 48

A) (10) Find the “5-number summary” and draw the corresponding box plot.

B) (5) Is the Bowley measure of skewness positive or negative for this data set?

C) (5) What is the standard deviation (SD) of this data set?

III. Suppose that a data set of  $n = 100$  lobster tail length measurements has been collected. The mean shell length in the sample is  $\bar{x} = 15\text{cm}$  and the SD is  $5\text{cm}$ .

A) (5) Would the  $z$ -score of a measurement  $x = 12$  be?

B) (5) What length measurement would correspond to a  $z$ -score of  $1.7$ ?

C) (5) Find a  $95\%$  confidence interval for the population mean tail length.

D) (10) Estimate the proportion of the population of lobsters with tail lengths between  $13$  and  $21\text{cm}$ . Are you assuming something here?

IV. Essay. (30) In Chapter 2 of *The Botany of Desire*, Michael Pollan says “the tulip is that rare figure of Apollonian beauty in a horticultural pantheon presided over by Dionysus,” and “color breaks can perhaps best be understood as an explosive outbreak of the Dionysian in the too-strict Apollonian world of the tulip – and the Dutch bourgeoisie.” Explain these statements: Who (or what) are Apollo and Dionysus? What do they represent? How did the figure of Dionysus appear in Chapter 1 as well?