

Answer the questions below. You may answer in the space provided. You may use the back or a separate sheet of paper if you need more space. You are to work in groups of no more than four people. Make sure to enter the names of your groupmates below.

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

Section: \_\_\_\_\_

Group Members: \_\_\_\_\_

1. Let the length  $L(t)$  at time  $t$  of a certain species of fish satisfy the differential equation

$$\frac{dL}{dt} = k(L_\infty - L) \quad (1)$$

for some positive constants  $k$  and  $L_\infty$ .

- (a) (2 points) Give any equilibrium solutions to (1). Determine if each equilibrium solution is stable or unstable.

- (b) (3 points) Solve (1) with the initial condition  $L(0) = L_0$  for some positive constant  $L_0$ .

- (c) (2 points) What is the return time for the solution?

2. (3 points) Evaluate

$$\int_0^1 x \ln x \, dx.$$