

Calculus for the Life Science I
MAT1330A , MAT1330B, MAT1330E
Assignment 2

Due date: Sept. 30

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DGD (circle one): 1 , 2 , 3 , 4

Student Name (printed): _____

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Question 1

A model for the change in population size of the zooplankton species **Daphnia galeata mendota** in Base Line Lake in Michigan is given by $N(t) = N_0e^{rt}$, where $N(t)$ is the population size at time t , N_0 is the initial size of the population and r is the **intrinsic rate of growth**.

a) If the initial size of the population is 200 and the size of the population after one week is 250, find the intrinsic rate of growth of this population.

$r =$

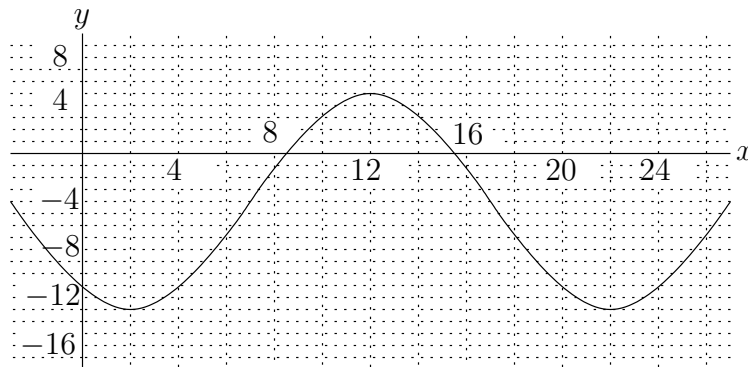
b) If the size of the population is 2.5 times its initial size after 2 weeks, find the intrinsic rate of growth of this population.

$r =$

c) If the intrinsic rate of growth is 0.95, what was the size of the initial population if the size of the population is 200 after 3 weeks? $N_0 =$

Question 2

A sinusoidal function f has the following graph.



$y = f(x)$

Give a formula to define f .

$$f(x) = \boxed{\phantom{f(x) = \text{[]}}}$$

Question 3

The activity level of mosquitoes over a swamp is measured by the number of mosquitoes by cubic meter. It is governed by a sinusoidal function. The maximum level of activity is a 19 :00 when there are about 10 mosquitoes by cubic meter and the lowest level is at 7 :00 when there are no mosquitoes by cubic meter.

a) Find the function f that governs the activity level of the population of mosquitoes as a function of the time t during the day.

$$f(t) = \boxed{\phantom{f(t) = \text{[]}}}$$

b) Draw the graph of the activity level of the population of mosquitoes as a function of the time.

