2.2.2 Exploratory Quiz: Computing Average Value

Bookmark this page

Question 1: Think About It...

1/1 point (graded)

Let's start with the average value of the function $M(t)$ describing marlin population. The average value of the function M over a time period length L is defined as:

$$\overline{M} = \frac{1}{L}\int_0^L M(t)\,dt.$$

- Take the differential equation for the rate of change of marlin, $\frac{dM}{dt} = -\mathbf{c}M + \mathbf{d}SM.$, and solve for M. Then substitute this expression for $M(t)$ into the formula for average value $\overline{M} = \frac{1}{L}\int_0^L M(t)\,dt$.
- Take the differential equation for the rate of change of sardines $\frac{dS}{dt} = \mathbf{a}S - \mathbf{b}SM$ and solve for M. Then substitute this expression for $M(t)$ into the formula for average value $\overline{M} = \frac{1}{L}\int_0^L M(t)\,dt$.

You now have two possible ways to think about $\overline{M} = \frac{1}{L}\int_0^L M(t)\,dt$. Which integral looks easier to evaluate? Why?

second one, since it contains the variable S only.

✔ Thank you for your response.

Explanation

These computations are covered in the next video. The integral from part (b) looks easier because it involves only S and its derivative $\frac{dS}{dt}$. The integral from part (a) involves two variables: S and the derivative of M, $\frac{dM}{dt}$.

Submit

Answers are displayed within the problem

Learn About Verified Certificates

English