

Class 04: Accumulated Change: Numbers and Graphs

Calculus II

College of the Atlantic. January 16, 2023



Figure 1: A psychedelic unicorn. Image by Gordon Dylan Johnson (<https://openclipart.org/artist/GDJ>). Image source <https://openclipart.org/detail/249455/prismatic-unicorn-silhouette-2-circles-3>

Unicorn theorists have theorized that the growth rate of the unicorn population on Beautiful Things Island is well approximated by the following function:

$$u(t) = 50 + t^2, \quad (1)$$

in units of kg of biomass, and where t is measured in months since 1 January, 2023. The biomass of the unicorns on the island is 300 kg at the start of 2023.

1. Using a Δt of 3 months, come up with a lower estimate for the biomass of the unicorns at the end of 2023.
2. Using a Δt of 3 months, come up with an upper estimate for the biomass of the unicorns at the end of 2023. (There is a slow and a less-slow way to do this.)
3. Using a Δt of 2 months, come up with a lower estimate for the biomass of the unicorns at the end of 2023.
4. Using a Δt of 2 months, come up with an upper estimate for the biomass of the unicorns at the end of 2023. (There is a slow and a less-slow way to do this.)
5. Suppose you needed to know the biomass of the unicorns at the end of 2023 to within 5 kg. What Δt would you choose?