Class 05: More with Accumulated Change
Calculus II
College of the Atlantic. January 15, 2024

1. The plots in Fig. 1 show six different possible functions for $u(x)$, the rate of change of unicorn biomass, in units of kg/day.

   (a) For each $u(x)$ is the total accumulated change after ten days positive, zero, or negative?

   (b) Which graph has a greater accumulated change, D or E? Why?

2. Let $r(t)$ be the rate at which snow falls, in inches per hour, where t is measured in hours since midnight. What is the practical interpretation of the following equations?

$$r(8) = 1.2 , \tag{1}$$
$$r'(8) = 0.2 . \tag{2}$$
$$\int_6^{14} r(t)\, dt = 9.5 . \tag{3}$$

   What are the units of 1.2, 0.2, and 9.5?

3. Apple pie filling is leaking from a storage container. The rate $r(t)$ at which it is leaking is given by the function:

$$r(t) = \sqrt{4 - x^2} , \tag{4}$$

   in units of metric tons per hour, and where t is measured in hours since the leak began. The leak lasts for two hours.

   (a) Write the total amount of apple pie filling that escapes as a definite integral.

   (b) Use left- and right-hand sums to estimate the value of the integral. You will want to do this on python. See what happens as Δt gets closer and closer to zero.
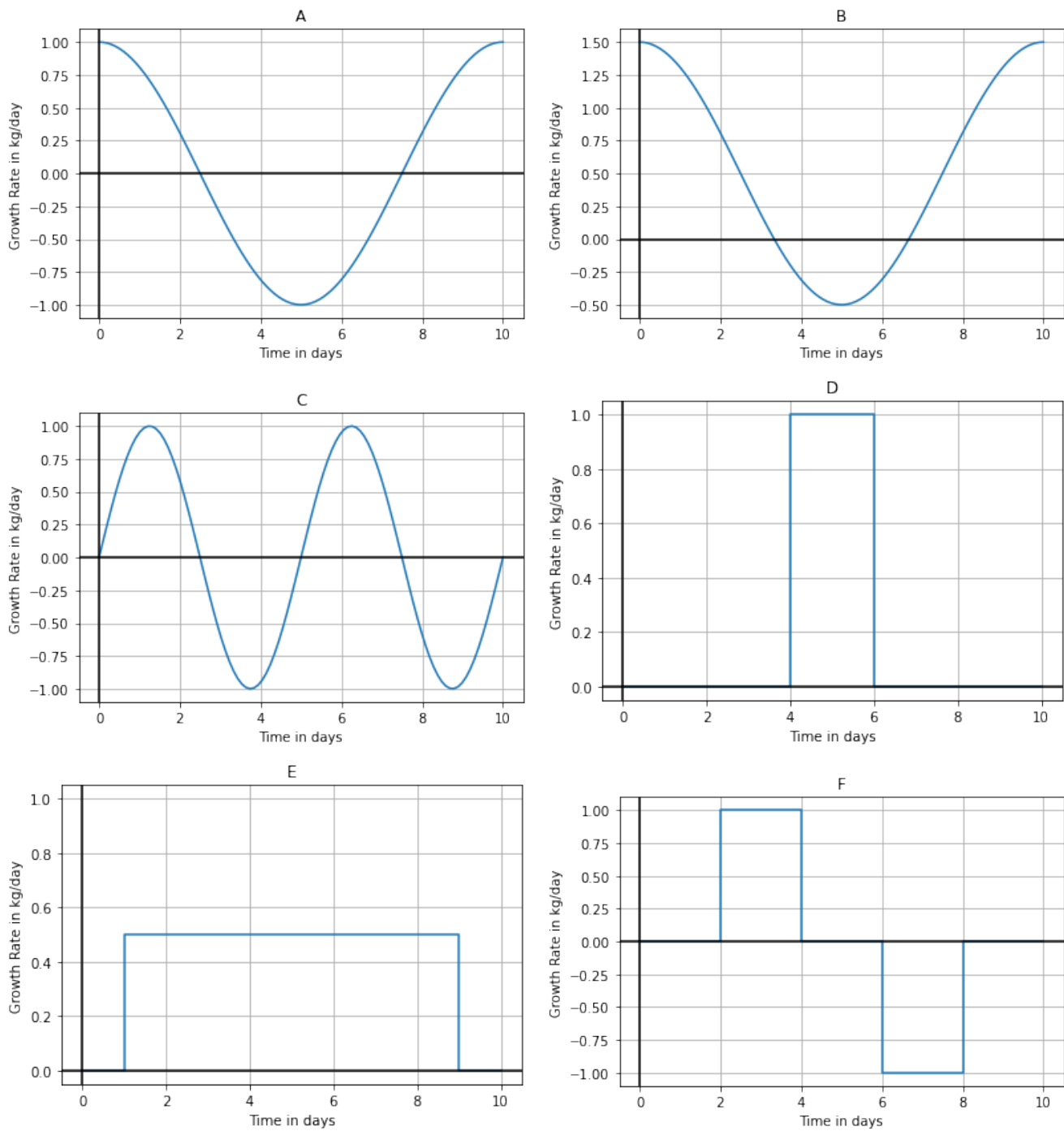
   (c) Hmm. Why did you get the answer you did?

Figure 1: Six different rates of change of the biomass of unicorns.