

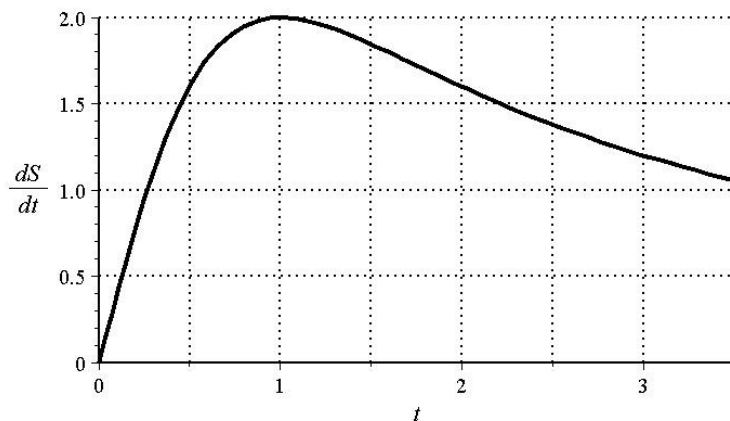
**Math 155. Homework 11. Sections 4.4 and 4.5.**

1. A plant produces starch depending on the intensity of heat it receives during the day. Assume the rate of starch production of the plant is

$$\frac{dS}{dt} = \frac{4t}{1+t^2} \text{ grams per hour}$$

where time  $t$  is measured in hours and  $S(t)$  is the amount of starch produced  $t$  hours after noon each day (time  $t = 0$  is noon,  $t = 1$  is 1pm and so on).

- a. Estimate the total change in  $S(t)$  between 1pm and 3pm using the right-hand Riemann sum with  $\Delta t = 0.5$ . Draw your rectangles or step functions on the figure below:



- b. Find the *exact* area under the curve  $\frac{4t}{1+t^2}$  between times  $t = 1$  and  $t = 3$ .

2. Let  $L(t)$  = the length (in cm) of a fish at time  $t$  (in years). Suppose that the fish grows at a rate  $\frac{dL}{dt} = 5.0e^{-0.2t}$ . Use the *definite integral* to determine the total change in length of the fish between times  $t = 5$  and  $t = 10$ .