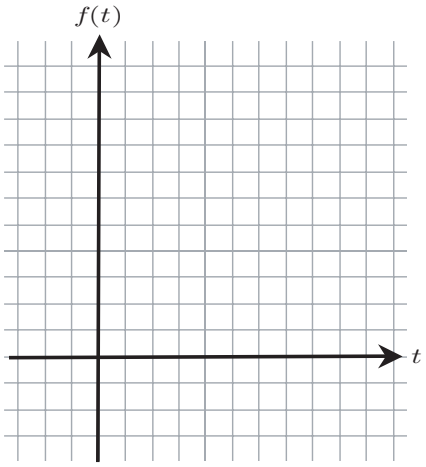
Classroom Activities

Activity 1 Accumulation (Worksheet outline)

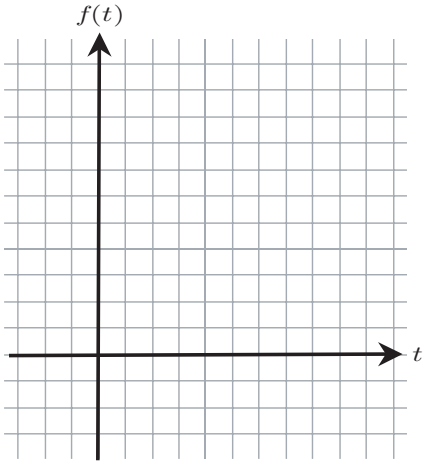
1a. On the axes provided graph $f(t) = 3$.

Let $[0, x]$, be an interval on the t-axis. Write the equation of the function $A_1(x)$ that gives the area of the region in the first quadrant under the graph of $y = f(t)$, above the t-axis, between $t = 0$ and $t = x$. Indicate where this region appears on the graph by shading a typical region and indicating where x is.



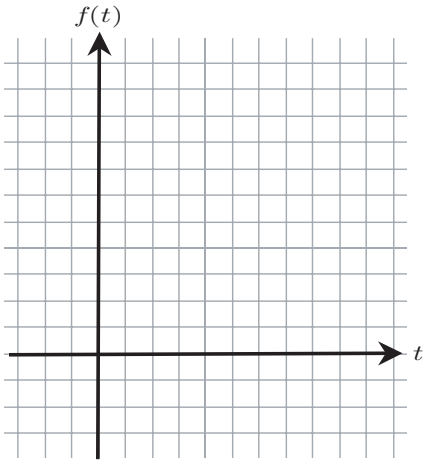
1b. On the axes provided graph $f(t) = 2t$.

Let $[0, x]$, be an interval on the t-axis. Write the equation of the function $A_2(x)$ that gives the area of the region in the first quadrant under the graph of $y = f(t)$, above the t-axis, between $t = 0$ and $t = x$. Indicate where this region appears on the graph by shading a typical region and indicating where x is.



1c. On the axes provided graph $f(t) = 2t + 3$.

Let $[0, x]$, be an interval on the t-axis. Write the equation of the function $A_3(x)$ that gives the area of the region in the first quadrant under the graph of $y = f(t)$, above the t-axis, between $t = 0$ and $t = x$. Indicate where this region appears on the graph by shading a typical region and indicating where x is.



1d. Fill in the table for these functions

x	0	1	2	3	4	5
$A_1(x)$						
$A_2(x)$						
$A_3(x)$						

Do these numbers agree with your idea of area? Why does $A_3 = A_1 + A_2$? Show graphically why this is true.

1e. Fill in the table for these functions

x	-1	-2	-3
$A_1(x)$			
$A_2(x)$			
$A_3(x)$			

Explain your reasoning, specifically tell how does this relate to the area?

1f. Calculate

$$\frac{d}{dx}A_1(x) =$$

$$\frac{d}{dx}A_2(x) =$$

$$\frac{d}{dx}A_3(x) =$$

What do you observe about the derivatives? Why do you think this is?

1g. Consider a new function $A_4(x)$ that gives the area under $y = 2t + 3$ on the interval $[2, x]$. Complete the table below. Find $\frac{d}{dx}A_4(x)$ and $\frac{d}{dx}A_3(x)$. Why are they equal?

x	-2	1	0	1	2	3	4	5
$A_4(x)$								