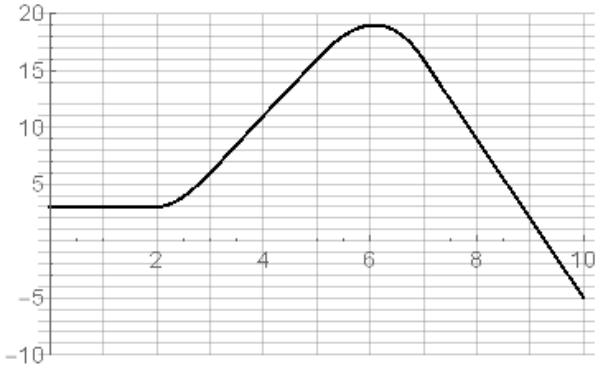
Fundamental Theorems of Calculus

Define derivative and describe verbal, graphical, numerical, and symbolic aspects.

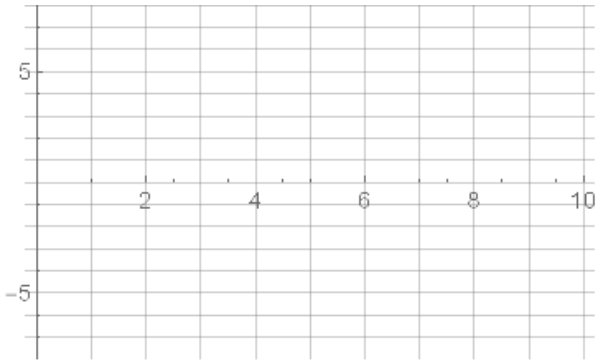
Suppose f is defined by the graph.



Estimate $f'(x)$ at each integer x in the table.

x	0	1	2	3	4	5	6	7	8	9	10
$f'(x)$											

Draw a graph of f'.



Define definite integral and describe verbal, graphical, numerical, and symbolic aspects.

Estimate $g(x) = \int_0^x f'(t)\,dt$ at each integer x.

x	0	1	2	3	4	5	6	7	8	9	10
$g(x)$											

Draw a graph of g on the axes containing the graph of f.

What is the relationship between g and f?

Fundamental Theorems of Calculus

Suppose today at 7:00AM was 43797.0 hours after David's car was built. Suppose $f(t)$ is the miles David's car has gone t hours after it was built.

Interpret $\dfrac{f\left(43797.5\right)-f\left(43797.0\right)}{43797.5-43797.0}=30$.

Interpret $f'(43797.25)=50$.

First Fundamental Theorem of Calculus

Suppose $g(t)$ is the miles per hour of David's car t hours after it was built. Interpret $g(43797.0)(0.2) + g(43797.2)(0.1) + g(43797.3)(0.2) = 14$.

Interpret $\int_{43797.0}^{43797.5} g(t)\,dt = 15$.

Restate the above in terms of the function f.

Second Fundamental Theorem of Calculus