Section 7.3

Step away from calculating $\int f(x) \, dx$. Start a new track that will connect to what we've been doing soon...

Derivative $\Rightarrow$ secant

Slope of a line $\Rightarrow$ slope of a tangent line at a pt.

$\Rightarrow$ slope of a tangent line at a pt.

$\Rightarrow$ Instantaneous r.o.c. $\Rightarrow$ R.O.C.

$\Rightarrow$ velocity = r.o.c. position $s(t)$

$\Rightarrow$ Marginal cost

Revenue

Profit
Integration

Start w/ Area under a Curve

Ex. 1) The velocity of a toy car is

\[ V(t) = 6 \text{ mi/hr.} \]

How many miles does the car travel in 3 hrs. ? t hours?

In 3 hrs, the car travels 18 mi.

\[ 3 \text{ hrs} \times (6 \text{ mi/hr.}) = 18 \text{ mi}. \]

In t hours the car travels

\[ s(t) = 6t \text{ miles} \quad \text{note } \int 6 \, dt = 6t + c \]

Area ⇒ \( 6t \text{ } \)

Area ⇒ accumulated change (total)
Ex. 2  A tub is filling w/ water at a rate of $g'(t) = 2t$ gal/min.

How much water is in the tub after 4 minutes?

$A = \frac{1}{2} b(h) \Rightarrow \text{Area} = \frac{1}{2} (4)(8) = 16 \text{ gal.}$

Note $\int t^2 \, dt = \frac{t^3}{3} + C$.  
accumulated change
Ex. 3

The r.o.c. of a pop. of geese is given by \( p'(t) = \text{geese/yr} \).

Find the accumulated change in no. of geese at \( t \).