FAR BEYOND

MAT122

Average Change

Stony Brook University

Accumulated Change

ex. Based on the graph below, which salesperson has the most total sales after 6 months?

Salesperson A (because their y-values are consistently higher over 6 months)

Which salesperson has the most total sales after the first year? What are sales for each?

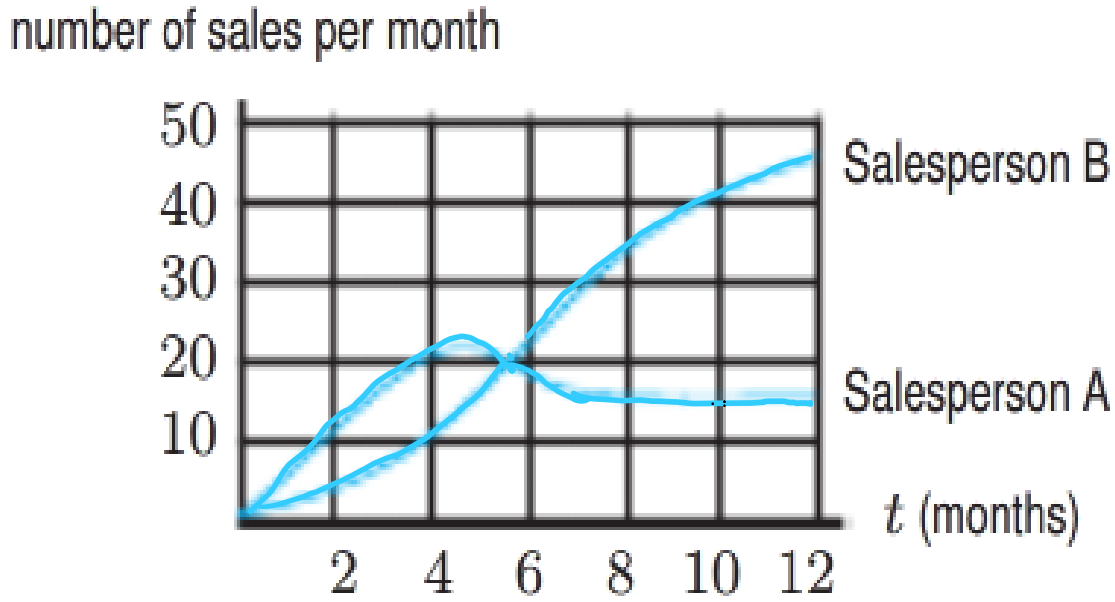
Count boxes under each graph:

Salesperson A:

$175 in sales

Salesperson B:

$265 in sales

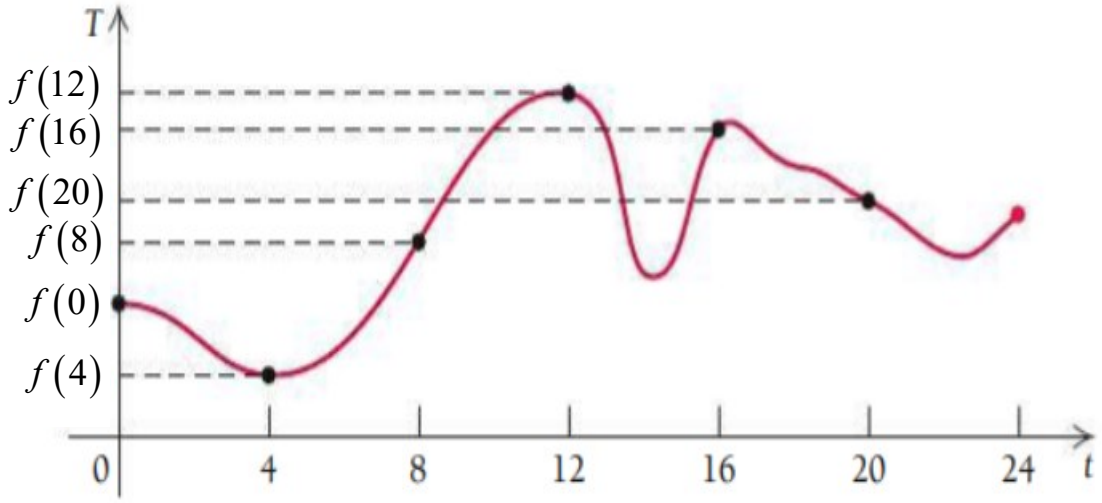


Average Value of a Continuous Function - Intro

An important use of area under the curve is finding the **average value** of a continuous function over a closed interval.

ex. Suppose a weather station measures the temperature at time t over a 24-hour period, $[0, 24]$.

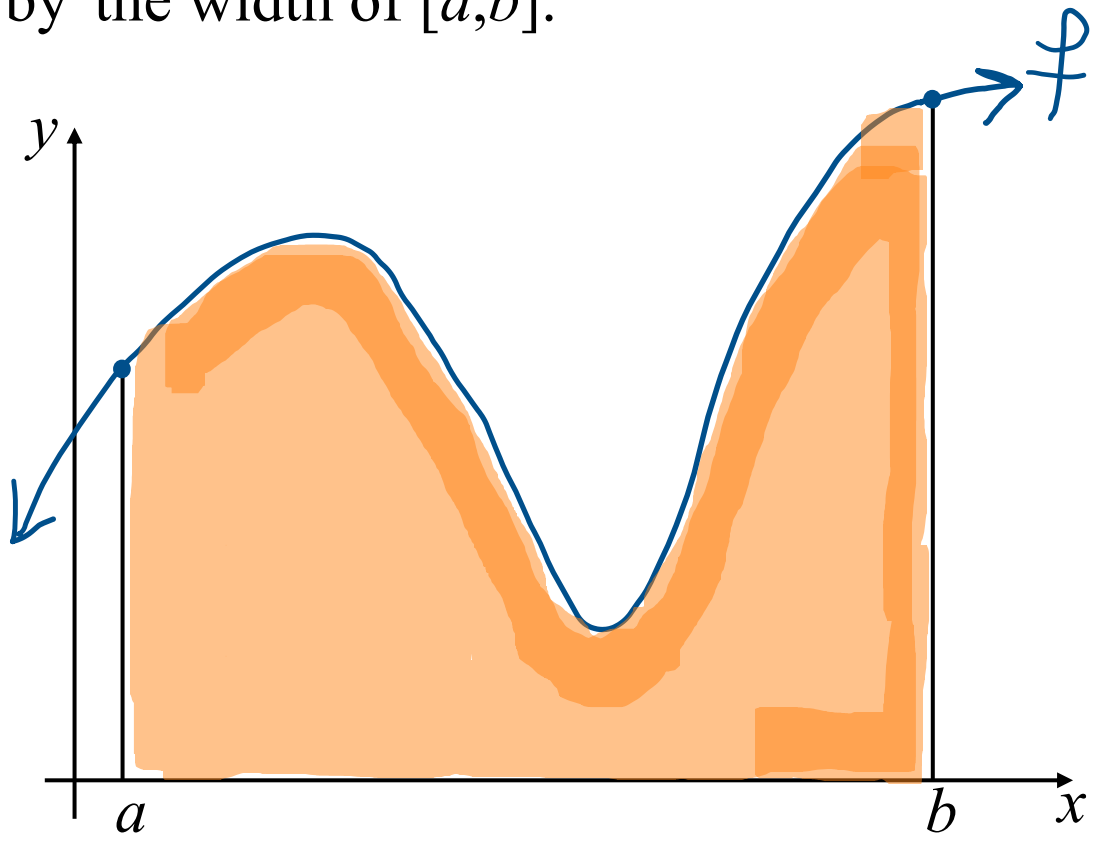
The function is continuous:



As can be expected, more readings would yield a more accurate estimate.

Average Value of a Continuous Function - Exact

Finding exact average value is simply done by evaluating the definite integral over $[a,b]$ and dividing the result by the width of $[a,b]$.



Average Value of a Continuous Function

Let f be continuous over $[a,b]$. Then its **average value**, y_{avg}, over $[a,b]$ is given by:

$$y_{avg} = \frac{1}{b-a}\int_a^b f(x)dx$$

ex. Find the average value of $f(x) = x^2$ over $[0,2]$.

$$= \boxed{\frac{4}{3}}$$

Average Value – Example #2

ex. Rico's speed, in mph, t min after entering the freeway, is given by:

$$y_{avg} = \frac{1}{b-a}\int_a^b f(x)dx$$

From 5 min after entering freeway to 25 min after doing so, what is Rico's average speed?

$$= \boxed{68\frac{3}{4}\text{ mph}}$$

Change in Value

ex. $f(t)$ is the value of an investment over a 5-month period

$f'(t)$ is the rate of change of $f(t)$

a. When is the value increasing and decreasing?

b. After 5 months, has the value increased or decreased?