

## 5.5 Videos Guide

### 5.5a

- Average value of a function  $f$  over an interval  $[a, b]$

$$\circ f_{\text{ave}} = \frac{1}{b-a} \int_a^b f(x) dx$$

Exercise:

- Find the average value of the function on the given interval.

$$g(t) = \frac{t}{\sqrt{3+t^2}}, [1, 3]$$

Theorem (statement):

- The Mean Value Theorem for Integrals: If  $f$  is continuous on  $[a, b]$ , then there exists a number  $c$  in  $[a, b]$  such that

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

$$\text{that is, } \int_a^b f(x) dx = f(c)(b-a)$$

### 5.5b

Exercises:

- (a) Find the average value of  $f$  on the given interval.  
(b) Find  $c$  in the given interval such that  $f_{\text{avg}} = f(c)$ .  
(c) Sketch the graph of  $f$  and a rectangle whose base is the given interval and whose area is the same as the area under the graph of  $f$ .  
 $f(x) = \sqrt[3]{x}, [0, 8]$
- Find the numbers  $b$  such that the average value of  $f(x) = 2 + 6x - 3x^2$  on the interval  $[0, b]$  is equal to 3.