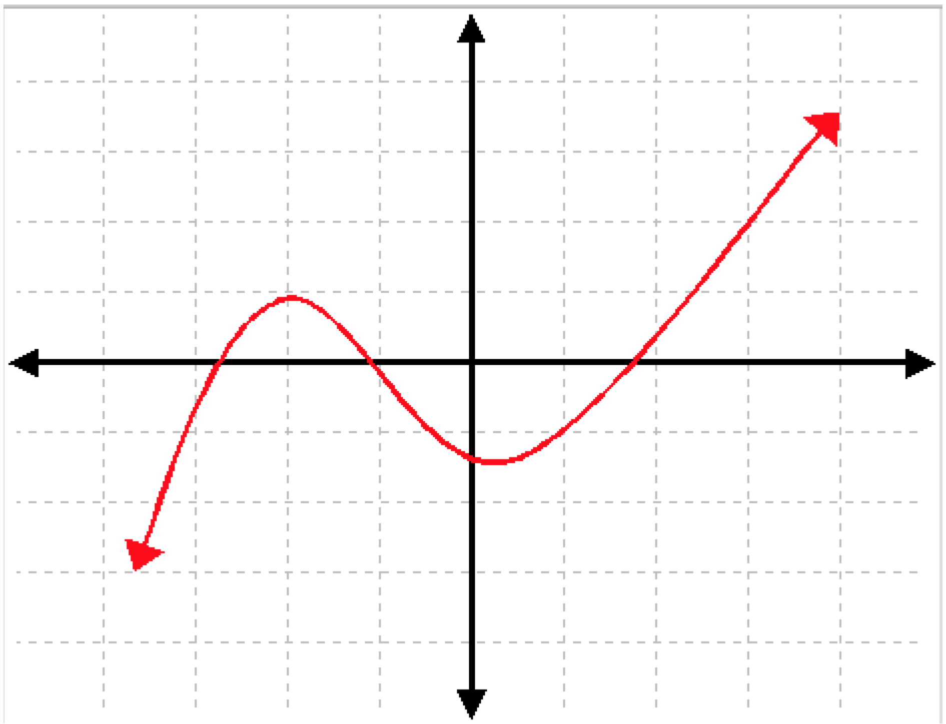

Definition 3.1.1. *The* **change** *of a function, $y = f(x)$, over an interval $a \le x \le b$ is*

Definition 3.1.2. *The* **average rate of change** *of a function, $y = f(x)$, over an interval $a \le x \le b$ is*

Definition 3.1.3. *The* **secant line** *from $x = a$ to $x = b$ of a function, $y = f(x)$, is the line connecting the two points $(a, f(a))$ and $(b, f(b))$. So its slope is*

Example 3.1.1. *Given* $y = 5x^3$, *find*

(1) *the change in* y *when* x *changes from* -1 *to* 2.
(2) *the average rate of change in* y *when* x *changes from* -1 *to* 2.
(3) *the slope of the secant line connecting the points* $(-1, f(-1))$ *and* $(2, f(2))$ $(f(x) = y)$.

Example 3.1.2. *Given* $y = -3\sqrt{x}$, *find*

(1) *the change in* y *when* x *changes from* 4 *to* 25.
(2) *the average rate of change in* y *when* x *changes from* 4 *to* 25.
(3) *the slope of the secant line connecting the points* $(4, f(4))$ *and* $(25, f(25))$ $(f(x) = y)$.

Velocities

Definition 3.1.4. *If $y = f(x)$ is a function representing the position of and object on a straight line at time x then the* **average velocity** *from $x = a$ to $x = b$ is given by*

Example 3.1.3. *Given $y = \sqrt[3]{x}$, where y is the straight line distance from a point and x is time, find the average velocity from $x = 1$ to $x = 27$.*

Difference Quotient

Definition 3.1.5. *Given a function $y = f(x)$, a* **difference quotient** *is an expression of the form*

Example 3.1.4. *Given $f(x) = x - 3x^2$, find $\dfrac{f(a+h) - f(a)}{h}$ when $a = -2$ and $h \neq 0$.*

Example 3.1.5. *Given $f(x) = \dfrac{1}{x}$, find $\dfrac{f(x) - f(a)}{x - a}$ when $a = 3$ and $x \neq a$.*

Homework: 3.1 p. 140 # 1-7 odd, 19, 23, 41, 45, 55, work e-grade practice at least 2 times.