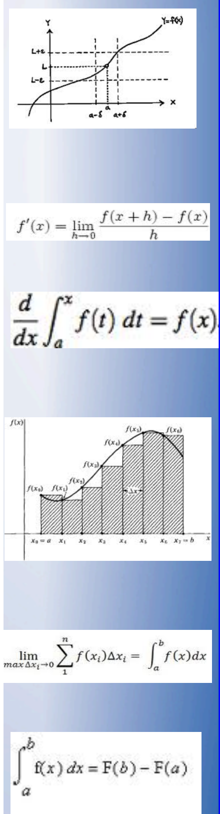
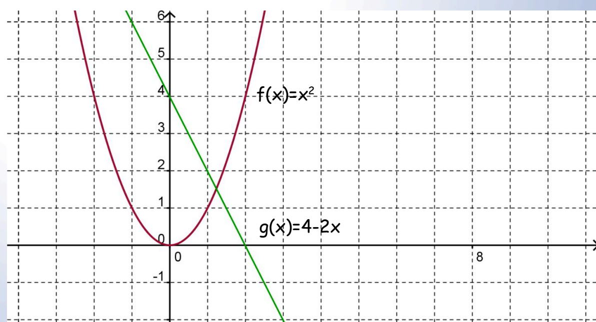


Calculus: 3 ~ Limit Theorems



$$\lim_{x \to 1} f(x) - g(x) = ?$$

Limit Theorems

n is a positive integer.

k is a real number

$f(x)$ & $g(x)$ have limits as $x \to c$

1) $\lim_{x \to c} k = k$

2) $\lim_{x \to c} x = c$

3) $\lim_{x \to c} [kf(x)] = k \lim_{x \to c} f(x)$

4) $\lim_{x \to c} [f(x) \pm g(x)] = \lim_{x \to c} f(x) \pm \lim_{x \to c} g(x)$

5) $\lim_{x \to c} [f(x)g(x)] = \lim_{x \to c} f(x) \lim_{x \to c} g(x)$

6) $\lim_{x \to c} \dfrac{f(x)}{g(x)} = \dfrac{\lim_{x \to c} f(x)}{\lim_{x \to c} g(x)}, \quad g(x) \neq 0$

7) $\lim_{x \to c} [f(x)]^n = [\lim_{x \to c} f(x)]^n$

8) $\lim_{x \to c} \sqrt[n]{f(x)} = \sqrt[n]{\lim_{x \to c} f(x)}, \quad if \quad \lim_{x \to c} f(x) > 0 \quad when\ n\ is\ even.$

3 Limit Theorems

EX 1 $\lim_{x\to 2}(4x^2 - 2x + 1)$

EX 2 $\lim_{x\to -3}\frac{\sqrt{x^2-1}}{2x}$

EX 3 If $\lim_{x\to a} f(x) = 3 \quad and \quad \lim_{x\to a} g(x) = -1,$

find $\lim_{x\to a}\frac{2f(x)-3g(x)}{f(x)+g(x)}$

Substitution Theorem

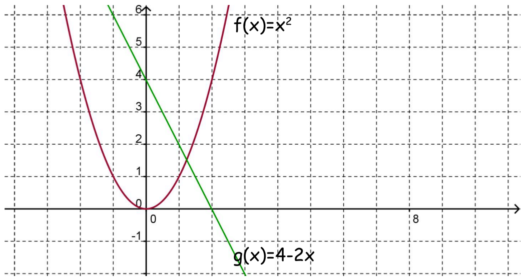
If *f(x)* is a polynomial or a rational function, then $\lim_{x\to c} f(x) = f(c)$ assuming *f(c)* is defined.

Ex 4 $\lim_{x\to -1}\frac{3x^2-4x^3+7x-5}{2x^2+3x+4}$

Ex 5 $\lim_{x\to 2}\frac{3x^3+4x+1}{x^2-x-2}$

EX 6 $\lim_{x\to 0}\frac{\sqrt{x+1}-1}{x}$ *Hint: rationalize the numerator.*

3 Limit Theorems



$\lim_{x \to 1} f(x) =$

$\lim_{x \to 1} g(x) =$

$\lim_{x \to 1} f(x) - g(x) = ?$