

### 1.3 Analytical Limits

A.  $\lim_{x \rightarrow 2} 2x = 4$   
 $2(2) = 4$

x	f(x)
1.9	3.8
1.99	
1.999	
2.1	4.2
2.01	4.02
2.001	4.002

$$\text{Ex. } \lim_{x \rightarrow 4} x^2 + 1 = 17$$

## B. Properties

1. Multiple:  $\lim_{x \rightarrow c} a \cdot f(x)$

$$= a \left[ \lim_{x \rightarrow c} f(x) \right]$$

Ex

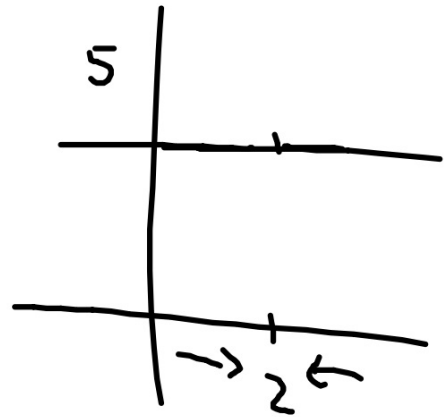
$$\lim_{x \rightarrow 5} 2x = 2 \left[ \lim_{x \rightarrow 5} x \right]$$

$$2. \lim_{x \rightarrow c} [f(x) \pm g(x)]$$

$$\lim_{x \rightarrow c} f(x) \pm \lim_{x \rightarrow c} g(x)$$

3.  $\lim_{X \rightarrow C} b = b$

$\lim_{X \rightarrow 2} 5 = 5$



$$4. \lim_{x \rightarrow c} \sin x = \sin c$$

Ex

$$\lim_{x \rightarrow \frac{\pi}{2}} \cos x = 0$$

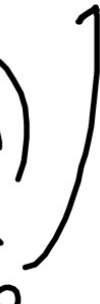
## C. Composites

$$1. \lim_{x \rightarrow c} f(g(x)) = f\left(\lim_{x \rightarrow c} g(x)\right)$$

Ex. Let  $f(x) = 2x + 3$ ,  $g(x) = \sqrt{x+3}$

$\lim_{x \rightarrow 3} f(g(x))$   
 $\lim_{x \rightarrow 3} g(x) = \sqrt{6}$

$2\sqrt{6} + 3$



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37-40