

Ch. 1.3a Evaluating Limits Algebraically Notes:

Rules:

Suppose $\lim_{x \rightarrow c} f(x) = L$

1) $\lim_{x \rightarrow c} b = b$

2) $\lim_{x \rightarrow c} b f(x) = bL$

I. To find limits for a function, first try to plug the argument (c) into the function. If the resulting value is a real number, then the value is the limit.

Ex. 1

a) $\lim_{x \rightarrow 2} (x^2 + 3x) = \square$

c) $\lim_{x \rightarrow -1} (3x^5 - 2x^2 + 7x + 4) =$

b) $\lim_{x \rightarrow 2} 5 = \square$

d) $\lim_{x \rightarrow \pi} x \cos x = \square$

II. Cancelling method:

*If you plug the argument (c) into the function and get a resulting value of $\frac{0}{0}$ (indeterminate form), then simplify further using factoring and cancelling.

Steps:

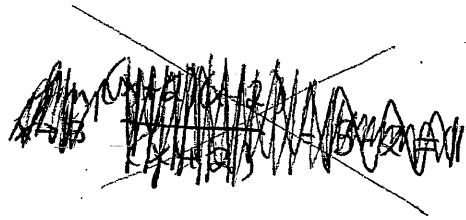
- 1) plug in argument
- 2) $\frac{0}{0}$ means evaluate further
- 3) Try finding common factors to cancel
- 4) plug in argument into reduced function
- 5) Confirm resulting value is a real number

Ex. 2 $\lim_{x \rightarrow -2} \frac{x^2 + 5x + 6}{x + 2}$

$$\boxed{\text{Ex.3}} \quad \lim_{x \rightarrow 1} \frac{x^2 + 5x + 6}{x - 1} =$$

$$\boxed{\text{Ex.4}} \quad \lim_{x \rightarrow 3} \frac{x^2 - 4}{x + 2} =$$

$$\boxed{\text{Ex.5}} \quad \lim_{x \rightarrow 2} \frac{x^2 - 4}{x + 2} =$$



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I. To find limits for a function, first try to plug the argument (c) into the function. If the resulting value is a real number, then the value is the limit.

Ex. 1

a) $\lim_{x \rightarrow 2} (x^2 + 3x) = \boxed{10}$

c) $\lim_{x \rightarrow -1} (3x^5 - 2x^2 + 7x + 4) = -8$

b) $\lim_{x \rightarrow 2} 5 = \boxed{5}$

d) $\lim_{x \rightarrow \pi} x \cos x = \pi \cos \pi = -\pi$

II. Cancelling method:

*If you plug the argument (c) into the function and get a resulting value of $\frac{0}{0}$ (indeterminate form), then simplify further using factoring and cancelling.

Steps:

- 1) plug in argument
- 2) $\frac{0}{0}$ means evaluate further
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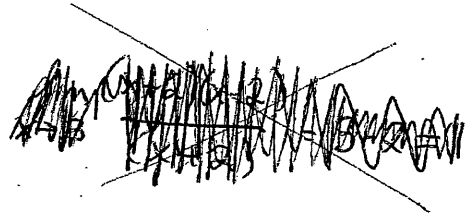
Ex. 2 $\lim_{x \rightarrow -2} \frac{x^2 + 5x + 6}{x + 2} = \frac{0}{0}$

$\lim_{x \rightarrow -2} \frac{\cancel{(x+2)}(x+3)}{\cancel{x+2}}$

$\lim_{x \rightarrow -2} x + 3 = \boxed{1}$

$$\boxed{\text{Ex. 3}} \quad \lim_{x \rightarrow 1} \frac{x^2 + 5x + 6}{x - 1} = \frac{12}{0}$$

$$\boxed{\text{Ex. 4}} \quad \lim_{x \rightarrow 3} \frac{x^2 - 4}{x + 2} = \frac{5}{5} = 1$$



$$\boxed{\text{Ex. 5}} \quad \lim_{x \rightarrow 2} \frac{x^2 - 4}{x + 2} = \frac{0}{4} = 0$$