Ch. 1.3a Evaluating Limits Algebraically Notes: **Key**

Rules: Suppose $\lim_{x\to c} f(x) = L$

1) $\lim_{x\to c} b = b$ 2) $\lim_{x\to c} b\,f(x) = bL$

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.

$\boxed{\text{Ex. 1}}$

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

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

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

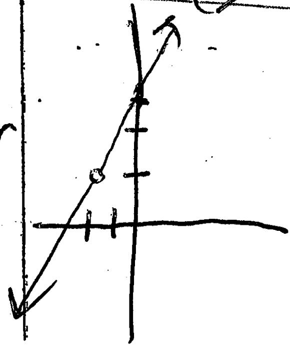
d) $\lim_{x\to \pi} x\cos x = \pi\cos\pi = \boxed{-\pi}$
$\pi(-1)$

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

$\boxed{\text{Ex. 2}}$ $\lim_{x\to -2} \frac{x^2+5x+6}{x+2}$ $\frac{0}{0}$

$\lim_{x\to -2} \frac{\cancel{(x+2)}(x+3)}{\cancel{(x+2)}} = \boxed{1}$



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

Recall: a) $\frac{0}{12} = 0$

b) $\frac{16}{0}$ = undefined

c) $\frac{0}{0}$ = indeterminate

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

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

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

$\boxed{\text{p. 67}}$ 1.3

52) $\lim_{x \to 2} \frac{x^2+2x-8}{x^2-x-2}$

$\lim_{x \to 2} \frac{(x^2+2x-8)}{x^2-x-2} = \frac{0}{0}$ $\lim_{x \to 2} \frac{(x+4)\cancel{(x-2)}}{\cancel{(x-2)}(x+1)}$

$\lim_{x \to 2} \frac{x+4}{x+1} = \frac{6}{3} = \boxed{2}$