XRONOS HW 1 #3:

$$\lim_{x\to -6^-} \frac{x+8}{x+6} = \frac{-6+8}{-6+6} = \frac{2}{0} \Rightarrow * \frac{\text{NUMBER}}{0}$$

SINCE $x \to -6^-$, TRY -6.1: $\frac{x+8}{x+6} = \frac{-6.1+8}{-6.1+6} = \frac{\text{POSITIVE \#}}{\text{NEGATIVE \#}} = \text{NEGATIVE \#}$

$\Downarrow$

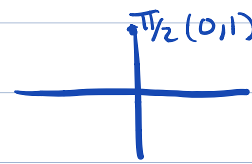
$\boxed{-\infty}$

XRONOS HW 1 #5:

$$\lim_{x\to \frac{5\pi}{2}^-} x^2\cot(x) = \left(\frac{5\pi}{2}\right)^2 \cot\left(\frac{5\pi}{2}\right)$$

$\cot\left(\frac{5\pi}{2}\right) = \cot\left(2\pi + \frac{\pi}{2}\right)$

$= \cot\left(\frac{\pi}{2}\right) = \frac{0}{1} = 0$



$$= \left(\frac{5\pi}{2}\right)^2 (0)$$

$$= \boxed{0}$$

XRONOS HW 1 #6:

$$\lim_{x\to 0^+} \frac{8}{x} - \ln(x) = \lim_{x\to 0^+} \frac{8}{x} - \lim_{x\to 0^+} \ln(x)$$

NOTE: $\lim_{x\to 0} \ln(x) = -\infty$

$$= \underbrace{\frac{8}{0}} - (-\infty)$$

"$\frac{\#}{0}$", SINCE $x \to 0^+$,

CHOOSE 0.1,

$\Rightarrow \frac{8}{0.1} = \frac{\text{POSITIVE \#}}{\text{POSITIVE \#}}$

$= \text{POSITIVE \#}$

$= +\infty$

$$= +\infty - (-\infty) = \boxed{+\infty}$$

XRONOS HW 1 #8:

$$\lim_{x\to 2^+} \frac{9e^x+4}{x-2} = \frac{9e^2+4}{0} \leftarrow \text{"}\frac{\#}{0}\text{"}$$

, SINCE $x \to 2^+$, CHOOSE 2.1:

$$\frac{9e^{2.1}+4}{2.1} = \frac{\text{POSITIVE \#}}{\text{POSITIVE \#}}$$

$$= \text{POSITIVE \#}$$

$$\Rightarrow +\infty$$

$$= \boxed{+\infty}$$

XRONOS HW 2 #6:

$$\lim_{x\to -2} \frac{-3x^3-24}{x^2+x-2} = \lim_{x\to -2} \frac{-3(x^3+8)}{(x+2)(x-1)} = \lim_{x\to -2} \frac{-3(\cancel{x+2})(x^2-2x+4)}{(\cancel{x+2})(x-1)}$$

RECALL:

$*(a^3+b^3)=(a+b)(a^2-ab+b^2)$

$$= \lim_{x\to -2} \frac{-3(x^2-2x+4)}{x-1}$$

$$= \frac{-3((-2)^2-2(-2)+4)}{-2-1}$$

$$= \boxed{12}$$

XRONOS HW 2 #7:

$$\lim_{x\to -\sqrt{3}} \frac{8(x^4-9)}{x^2-3} = \lim_{x\to -\sqrt{3}} \frac{8(x^2+3)\cancel{(x^2-3)}}{\cancel{x^2-3}} = \lim_{x\to -\sqrt{3}} 8(x^2+3)$$

$$= 8((-\sqrt{3})^2+3)$$

$$= 8(3+3) = \boxed{48}$$

XRONOS HW 2 #8:

$$\lim_{x\to -8} \frac{-4(x+5)^2+1}{\frac{1}{3x+2}+2} = \frac{-4(-8+5)^2+1}{\frac{1}{3(-8)+2}+2} = \frac{-4(-3)^2+1}{-\frac{1}{22}+\frac{44}{22}}$$

$$= \frac{-37}{\left(\frac{43}{22}\right)} = \boxed{-\frac{814}{43}}$$

XRONOS HW 2 #14:

$$\lim_{x\to -2} \frac{-6|x|+12}{3x+6}$$

$\bigstar \; |x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$

1. $\lim_{x\to -2^+} \frac{-6|x|+12}{3x+6}$: SINCE $x \to -2^+$, TRY $x=-1$: $\lim_{x\to -2^+} \frac{-6(-x)+12}{3x+6}$

$$= \lim_{x\to -2^+} \frac{6x+12}{3x+6}$$

$$= \lim_{x\to -2^+} \frac{6(\cancel{x+2})}{3(\cancel{x+2})}$$

$$= \frac{6}{3} = 2$$

2. $\lim_{x\to -2^-} \frac{-6|x|+12}{3x+6}$: SINCE $x \to -2^-$, TRY $x=-3$: $\lim_{x\to -2^-} \frac{-6(-x)+12}{3x+6}$

$$= \lim_{x\to -2^-} \frac{6x+12}{3x+6}$$

$$= \lim_{x\to -2^-} \frac{6(\cancel{x+2})}{3(\cancel{x+2})}$$

$$= \frac{6}{3} = 2$$

SINCE $\lim_{x\to 2^+} \frac{-6|x|+12}{3x+6} = 2 = \lim_{x\to 2^-} \frac{-6|x|+12}{3x+6}$, $\lim_{x\to 2} \frac{-6|x|+12}{3x+6} = \boxed{2}$

XRONOS HW 2 #15:

GIVEN $\lim_{x\to -1} f(x) = -3$ AND $\lim_{x\to 0} g(x) = 3$, FIND $\lim_{x\to 0} f(x-1)\, g(x)$

$$\lim_{x\to 0} f(x-1)g(x) = \lim_{x\to 0} f(x-1) \lim_{x\to 0} g(x)$$

$$= (f(0-1))(3) = (f(-1))(3) = (-3)(3) = \boxed{-9}$$

XRONOS HW 2 #16:

GIVEN $\lim_{x\to 4} f(x) = 3$ AND $\lim_{x\to 0} g(x) = -5$, FIND $\lim_{x\to 0} f(x+4) + g(x)$

$$\lim_{x\to 0} f(x+4) + \lim_{x\to 0} g(x) = f(0+4) + (-5) = 3 + (-5) = \boxed{-2}$$

XRONOS HW 2 #17:

GIVEN $\lim_{x\to -4} f(x) = -5$ AND $\lim_{x\to 0} g(x) = -3$, FIND:

1. $\lim_{x\to 0} f(x-4)g(x) = \lim_{x\to 0} f(0-4) \lim_{x\to 0} g(x) = f(0-4)(-3) = (-5)(-3) = \boxed{15}$

2. $\lim_{x\to 0} f(x-4) + g(x) = \lim_{x\to 0} f(x-4) + \lim_{x\to 0} g(x) = f(0-4) + (-3) = -5 + -3 = \boxed{-8}$

3. $\lim_{x\to 0} g(x) - f(x-4) = \lim_{x\to 0} g(x) - \lim_{x\to 0} f(x-4) = -3 - (-5) = \boxed{2}$

4. $\lim_{x\to -4} \frac{f(x)}{g(x+4)} = \frac{\lim_{x\to -4} f(x)}{\lim_{x\to -4} g(x+4)} = \frac{-5}{g(-4+4)} = \frac{-5}{-3} = \boxed{\frac{5}{3}}$

XRONOS HW 2 #12:

$$\lim_{x\to -1} -(9x^2 - 5x - 4)(x^{1/3} - 2) = -(9(-1)^2 - 5(-1) - 4)((-1)^{1/3} - 2)$$

$$= -(9 + 5 - 4)(\sqrt[3]{-1} - 2)$$

$$= -(10)(-1 - 2)$$

$$= -(10)(-3) = \boxed{30}$$

XRONOS HW2 #13:

$$\lim_{x\to 5} \frac{-2x+10}{|x-5|} = \lim_{x\to 5} \frac{-2(x-5)}{|x-5|}$$

CASE 1:

$\lim_{x\to 5^+} \frac{-2(x-5)}{|x-5|}$ SINCE $x \to 5^+$, $x>5 \Rightarrow \lim_{x\to 5^+} \frac{-2\cancel{(x-5)}}{\cancel{x-5}} = -2$

CASE 2:

$\lim_{x\to 5^-} \frac{-2(x-5)}{|x-5|}$ SINCE $x \to 5^-$, $x<5 \Rightarrow \lim_{x\to 5^-} \frac{-2\cancel{(x-5)}}{-\cancel{(x-5)}} = \frac{-2}{-1} = 2$

SINCE $\lim_{x\to 5^+} \neq \lim_{x\to 5^-}$, $\boxed{\text{DNE}}$

XRONOS HW2 #18:

$$\lim_{x\to -3} (x+3)\cos\left(\frac{-20}{x+3}\right)$$

1. TRUE STATEMENT: SINCE RANGE OF $\cos(x)$ IS $[-1,1]$,

$$-1 \le \cos\left(\frac{-20}{x+3}\right) \le 1$$

2. MANIPULATE $-1 \le \cos\left(\frac{-20}{x+3}\right) \le 1$ SO WE HAVE OUR ORIGINAL FUNCTION INSIDE. TO DO THIS, MULTIPLY BY $(x+3)$:

$$-(x+3) \le (x+3)\cos\left(\frac{-20}{x+3}\right) \le x+3$$

$$-x-3 \le (x+3)\cos\left(\frac{-20}{x+3}\right) \le x+3$$

3. TAKE LIMIT ON ALL PARTS:

$$\underbrace{\lim_{x\to -3}(-x-3)}_{\text{THIS LIMIT IS } 0} \le \lim_{x\to -3}(x+3)\cos\left(\frac{-20}{x+3}\right) \le \underbrace{\lim_{x\to -3}(x+3)}_{\text{THIS LIMIT IS } 0}$$

SO, BY THE SQUEEZE THEOREM, $\lim_{x\to -3}(x+3)\cos\left(\frac{-20}{x+3}\right)=0$