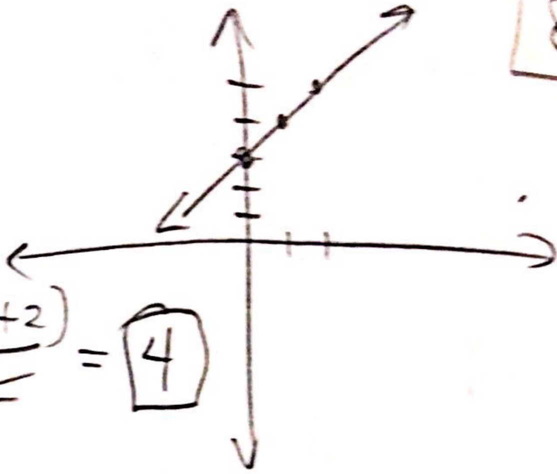
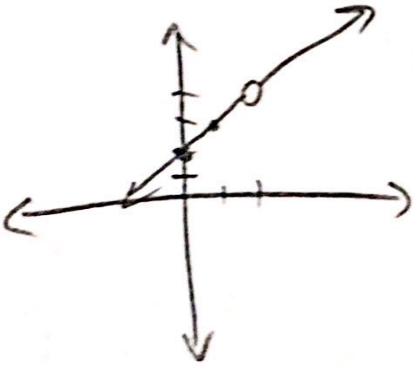
Algebraic Limits

$\boxed{8 \mid 29}$

① $\lim_{x \to 2} (x+3) = 5$



② $\lim_{x \to 2^-} \left(\frac{x^2-4}{x-2} \right) = \lim_{x \to 2^-} \frac{\cancel{(x-2)}(x+2)}{\cancel{x-2}} = \boxed{4}$



① Try to plug in x=___
If get a # answer, then that's the value of limit.

* If get $\frac{0}{0}$ MUST <u>SIMPLIFY</u>! <u>Then</u> substitute

③ $\lim_{x \to 4^-} \left(\frac{x-4}{\sqrt{x}-2} \right) \cdot \frac{\sqrt{x}+2}{\sqrt{x}+2}$

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

④ $\lim_{x \to -3} \left(\frac{x^2+2x-3}{x^2+7x+12} \right) = \lim_{x \to -3} \frac{\cancel{(x+3)}(x-1)}{\cancel{(x+3)}(x+4)} = \boxed{-4}$

⑤ $\lim_{x \to 2^-} \left(\frac{x^2-3x+1}{x^2+5x+6} \right) = \boxed{-\frac{1}{20}}$

⑥ $\lim_{x \to 2} \left(\frac{x-2}{x^5-32} \right) = \lim_{x \to 2} \frac{\cancel{x-2}}{\cancel{(x-2)}(x^4+2x^3+4x^2+8x+16)} = \frac{1}{80}$

2	1	0	0	0	0	-32
		2	4	8	16	32
	1	2	4	8	16	$\boxed{0}$

$$\lim_{x\to5^+} \frac{\frac{1}{x}-\frac{1}{5}}{x-5}\cdot\frac{5x}{5x} = \lim_{x\to5^+} \frac{\overset{-(\cancel{x-5})}{\cancel{5-x}}}{5x(\cancel{x-5})} = \boxed{\frac{-1}{25}}$$

$$\lim_{x\to0} \frac{\sqrt{4+x}-2}{x}\cdot\frac{\sqrt{4+x}+2}{\sqrt{4+x}+2} = \lim_{x\to0} \frac{\cancel{4}+\overset{1}{\cancel{x}}\cancel{-4}}{\cancel{x}(\sqrt{4+x}+2)}$$

$$= \boxed{\frac{1}{4}}$$

$$\lim_{\Delta x\to0} \frac{(x+\Delta x)^2-x^2}{\Delta x} = \lim_{\Delta x\to0} \frac{\cancel{x^2}+2x\Delta x+(\Delta x)^2\cancel{-x^2}}{\Delta x}$$

$$= \lim_{\Delta x\to0} \frac{\cancel{\Delta x}(2x+\Delta x)}{\cancel{\Delta x}} = \boxed{2x}$$

$$f(x)=\begin{cases} 3x^2-2x+1 & x<1 \\ 3 & x=1 \\ 2x+4 & x>1 \end{cases}$$

$$\lim_{x\to1^-} f(x)=3(1)^2-2(1)+1 = \boxed{2} \qquad \lim_{x\to1^+} f(x)=2(1)+4 = \boxed{6} \qquad \lim_{x\to1} f(x)= \boxed{\text{DNE}}$$

Because one-sided ≠

$$f(x)=\begin{cases} 3x-1 & x<2 \\ 4 & x=2 \\ 2x+1 & x>2 \end{cases}$$

$$\lim_{x\to2^-} f(x)=5 \qquad \lim_{x\to2^+} f(x)=5 \qquad \lim_{x\to2} f(x)=5 \qquad \lim_{x\to6} f(x)= 13$$