

$$\lim_{x \rightarrow r^+} f_{x-r} = \omega^+ = \omega$$

$$\lim_{x \rightarrow r^-} f_{x-r} = \omega^- = \omega$$

1

$$\lim_{x \rightarrow r^+} f_{[x]-r} = f[r^+] - r = \omega$$

2

$$\lim_{x \rightarrow r^-} f_{[x]-r} = f[r^-] - r = f[r^-] - r = 1$$

$$\lim_{x \rightarrow r^+} [f_{x-r}] = [\omega^+] = \omega$$

3

$$\lim_{x \rightarrow r^-} [f_{x-r}] = [\omega^-] = r$$

$$\left[ \lim_{x \rightarrow r^+} f_{x-r} \right] = [\omega] = \omega$$

4

$$\left[ \lim_{x \rightarrow r^-} f_{x-r} \right] = [\omega] = \omega$$

$$\lim_{x \rightarrow r} \frac{f_{x-r}}{x-r} \quad \begin{matrix} x=r^+ \rightarrow +\infty \\ x=r^- \rightarrow -\infty \end{matrix}$$

5

$$\lim_{x \rightarrow r} \frac{f_{x-r}}{(x-r)^+} \quad \begin{matrix} x=r^+ \rightarrow +\infty \\ x=r^- \rightarrow +\infty \end{matrix}$$

$$\lim_{x \rightarrow 3} \frac{f(x)-f}{\sqrt{x}-f} = \begin{cases} x \rightarrow 3^+ \rightarrow \frac{9}{\sqrt{0^+}} = \frac{9}{0^+} = +\infty \\ x \rightarrow 3^- \rightarrow \frac{9}{\sqrt{0^-}} = \frac{9}{0^-} = -\infty \end{cases}$$

$$\lim_{x \rightarrow 3} \frac{f(x)-f}{\sqrt{x^2-9}} = \lim_{x \rightarrow 3} \frac{f(x)-f}{|x-3|} = \begin{cases} x \rightarrow 3^+ \rightarrow \frac{9}{0^+} = +\infty \\ x \rightarrow 3^- \rightarrow \frac{9}{0^-} = -\infty \end{cases}$$

$$\lim_{x \rightarrow 3} \frac{f(x)-f}{x^2-9} = \lim_{x \rightarrow 3} \frac{f(x)-f}{(x-3)(x+3)} = \begin{cases} x \rightarrow 3^+ = +\infty \text{ (لانه)} \\ x \rightarrow 3^- = -\infty \text{ (لانه)} \end{cases}$$

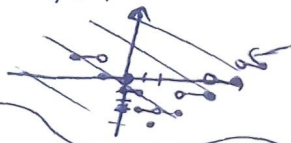
$$\lim_{x \rightarrow 3} \frac{f(x)-f}{[x-3]} = \begin{cases} x \rightarrow 3^+ \rightarrow \frac{9}{0^+} = \frac{9}{0} = \infty \\ x \rightarrow 3^- \rightarrow \frac{9}{0^-} = \frac{9}{-1} = -9 \end{cases}$$

$$\lim_{x \rightarrow 3} [3x] + [-2x] = \begin{cases} x \rightarrow 3^+ \Rightarrow [9^+] + [-6^-] = 9 - 6 = 3 \\ x \rightarrow 3^- \Rightarrow [9^-] + [-6^+] = 8 - 6 = 2 \end{cases}$$

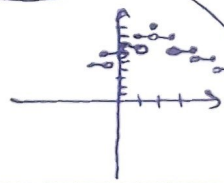
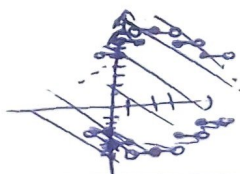
$$\lim_{x \rightarrow -9} [-2x] + [x] = \begin{cases} x \rightarrow -9^+ \Rightarrow [18^-] + [-9^+] = 18 - 9 = 9 \\ x \rightarrow -9^- \Rightarrow [18^+] + [-9^-] = 18 - 9 = 9 \end{cases}$$

$$\lim_{x \rightarrow 2} [x^2 - 2x] = \begin{cases} x \rightarrow 2^+ \Rightarrow [0^+] = 0 \\ x \rightarrow 2^- \Rightarrow [0^-] = 0 \end{cases}$$

x	-	0	+	+
x <sup>2</sup>	-	0	-	+
x <sup>2</sup> - 2x	-	0	-	+
f	-	0	-	+



$$\lim_{x \rightarrow 3} [4x - x^2] = \begin{cases} x \rightarrow 3^+ \Rightarrow = +\infty \\ x \rightarrow 3^- \Rightarrow = +\infty \end{cases}$$



$$\lim_{x \rightarrow 1} \frac{|x-1|}{x^2-1} = \lim_{x \rightarrow 1} \frac{|x-1|}{(x-1)(x+1)} = \begin{cases} x \rightarrow 1^+ \rightarrow = \lim_{x \rightarrow 1^+} \frac{1}{x+1} = \frac{1}{2} \\ x \rightarrow 1^- \rightarrow = \lim_{x \rightarrow 1^-} \frac{-1}{x+1} = -\frac{1}{2} \end{cases}$$

$$\lim_{x \rightarrow 1} \frac{x - [x]}{x^2-1} = \begin{cases} x \rightarrow 1^+ \Rightarrow = \lim_{x \rightarrow 1^+} \frac{x-1}{(x+1)(x-1)} = \frac{1}{2} \\ x \rightarrow 1^- \Rightarrow = \lim_{x \rightarrow 1^-} \frac{x-0}{(x+1)(x-1)} = \frac{1}{0^-} \Rightarrow -\infty \end{cases}$$