

الف) $\lim_{x \rightarrow 2^+} f(x) - 3 = \infty$
 $\lim_{x \rightarrow 2^+} (f(x) - 3) = \infty$

ب) $\lim_{x \rightarrow 2^-} f(x) - 3 = 1 - 3 = \infty$
 $\lim_{x \rightarrow 2^-} (f(x) - 3) = \infty$

۱

الف) $\lim_{x \rightarrow 2^+} f[x] - 3 = f[2^+] - 3 = \infty$

ب) $\lim_{x \rightarrow 2^-} f[x] - 3 = f[2^-] - 3 = 1$

۲

الف) $\lim_{x \rightarrow 2^+} [f(x) - 3] \rightarrow [1^+ - 3] = [\infty^+] = \infty$

ب) $\lim_{x \rightarrow 2^-} [f(x) - 3] = [1^- - 3] = [\infty^-] = \infty$

۳

$\left[\lim_{x \rightarrow 2^+} f(x) - 3 \right] = \left[\lim_{x \rightarrow 2^+} 1 - 3 \right] = [\infty] = \infty$

ب) $\left[\lim_{x \rightarrow 2^-} f(x) - 3 \right] = \left[\lim_{x \rightarrow 2^-} 1 - 3 \right] = [\infty] = \infty$

۴

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

ب) $\lim_{x \rightarrow 2} \frac{f(x) - 3}{(x-2)^2} = \frac{9}{0^+} = +\infty$
 $\lim_{x \rightarrow 2} \frac{f(x) - 3}{(x-2)^2} = \frac{9}{(0^-)^2} = \frac{9}{0^+} = +\infty$

۵

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

6

$$b) \lim_{x \rightarrow 1} \frac{f(x) - 3}{\sqrt{x^2 - 9} + 3} = \frac{9}{\sqrt{0} + 3} = \frac{9}{3} = 3 \begin{cases} x \rightarrow 1^+ & \frac{9}{\sqrt{0} + 3} = \frac{9}{3} = 3 \\ x \rightarrow 1^- & \frac{9}{\sqrt{0} + 3} = \frac{9}{3} = 3 \end{cases}$$

$$ii) \lim_{x \rightarrow 3} \frac{f(x) - 3}{x^2 - \sqrt{x+1}} = \frac{9}{0} \begin{cases} x \rightarrow 3^+ & \frac{9}{0^+} = +\infty \\ x \rightarrow 3^- & \frac{9}{0^-} = -\infty \end{cases}$$

7

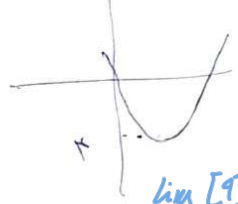
$$b) \lim_{x \rightarrow 3} \frac{f(x) - 3}{x - 3} \begin{cases} x \rightarrow 3^+ & \frac{9}{0^+} = +\infty \\ x \rightarrow 3^- & \frac{9}{0^-} = -\infty \end{cases}$$

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

8

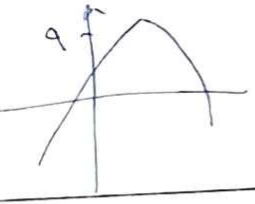
$$b) \lim_{x \rightarrow -4} [-f(x)] + [2x] \begin{cases} x \rightarrow -4^+ & [-f(x) - 4^+] + [2x - 4^+] = -2 - 4 = -6 \\ x \rightarrow -4^- & [-f(x) - 4^-] + [2x - 4^-] = -2 - 4 = -6 \end{cases}$$

$$ii) \lim_{x \rightarrow 2} [x^2 - f(x)] \begin{cases} x \rightarrow 2^+ & [4^+] - [f(x)] \\ x \rightarrow 2^- & [4^-] - [f(x)] \end{cases}$$



$\lim_{x \rightarrow 2} [f(x)] = 1$...

$$c) \lim_{x \rightarrow 3} [4x - x^2] = \lim_{x \rightarrow 3} [4x - x^2] = 12 - 9 = 3$$



$$ii) \lim_{x \rightarrow 2} \frac{|x-2|}{x^2 - \sqrt{x+1}} = \frac{0}{0} \begin{cases} x \rightarrow 2^+ & \frac{0^+}{(2^+)^2 - \sqrt{2^++1}} = \frac{0^+}{4 - \sqrt{3}} \\ x \rightarrow 2^- & \frac{0^-}{(2^-)^2 - \sqrt{2^-+1}} = \frac{0^-}{4 - \sqrt{3}} \end{cases}$$

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

10