

الف) $\lim_{x \rightarrow 2^+} \frac{2x+5}{x+1} = \lim_{x \rightarrow 2^+} \frac{2(2)+5}{2+1} = 3$

ج) $\lim_{x \rightarrow 2} \frac{2x+5}{x+1} = \lim_{x \rightarrow 2} \frac{(2)(2)+5}{2+1} = 3$

ب) $\lim_{x \rightarrow 2^-} \frac{2x+5}{x+1} = \lim_{x \rightarrow 2^-} \frac{2(2)+5}{2+1} = 3$

د) $\lim_{x \rightarrow 0} \frac{2x+1}{[x^2]}$
 تقریباً $x > 0 \Rightarrow x^2 > 0 \Rightarrow \lim_{x \rightarrow 0^+} \frac{1}{x^2} = +\infty$
 تقریباً $x < 0 \Rightarrow x^2 > 0 \Rightarrow \lim_{x \rightarrow 0^-} \frac{1}{x^2} = +\infty$

الف) $\lim_{x \rightarrow 10^-} \lfloor x \rfloor - 2 = \lim_{x \rightarrow 10^-} \lfloor 10^- \rfloor - 2 = \lim_{x \rightarrow 10^-} 9 - 2 = 7$

ب) $\lim_{x \rightarrow 10^-} \lfloor \lfloor x \rfloor - 2 \rfloor = \lim_{x \rightarrow 10^-} \lfloor 9 - 2 \rfloor = 7$

ج) $\lfloor \lim_{x \rightarrow 10^+} x - 2 \rfloor = \lfloor \lim_{x \rightarrow 10^+} \lfloor x \rfloor - 2 \rfloor = 10$

د) $\lfloor \lim_{x \rightarrow 10^-} \lfloor x \rfloor - 2 \rfloor = \lfloor \lim_{x \rightarrow 10^-} (9 - 2) \rfloor = 7$

الف) $\lim_{x \rightarrow 10^-} \frac{3 \lfloor x \rfloor + 1}{2} = \lim_{x \rightarrow 10^-} \frac{3 \lfloor 10^- \rfloor + 1}{2} = \lim_{x \rightarrow 10^-} \frac{3(9) + 1}{2} = \frac{28}{2} = 14$

ب) $\lim_{x \rightarrow 10^-} \lfloor \frac{3x+1}{2} \rfloor = \lim_{x \rightarrow 10^-} \lfloor 15^- \rfloor = 14$

ج) $\lfloor \lim_{x \rightarrow 10^+} \frac{3x+1}{2} \rfloor = \lfloor \lim_{x \rightarrow 10^+} \frac{3(10)+1}{2} \rfloor = 15$

د) $\lfloor \lim_{x \rightarrow 10^-} \frac{3x+1}{2} \rfloor = \lfloor \lim_{x \rightarrow 10^-} \frac{3(10)+1}{2} \rfloor = 15$

الف) $\lim_{x \rightarrow 1} \frac{x-5}{x^2-7x+5} = \lim_{x \rightarrow 1^+} \frac{x-5}{x^2-7x+5} = \frac{1-5}{1-7+5} = \frac{-4}{-1} = 4$
 $\lim_{x \rightarrow 1^-} \frac{x-5}{x^2-7x+5} = \frac{1-5}{1-7+5} = \frac{-4}{-1} = 4$

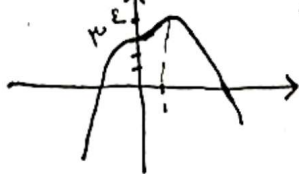
ب) $\lim_{x \rightarrow 1} \frac{x-5}{x^2-7x+5} = \lim_{x \rightarrow 1} \frac{x-5}{(x-1)^2} = \lim_{x \rightarrow 1^+} \frac{x-5}{(x-1)^2} = \frac{1-5}{(1-1)^2} = \frac{-4}{0^+} = -\infty$
 $\lim_{x \rightarrow 1^-} \frac{x-5}{(x-1)^2} = \frac{1-5}{(1-1)^2} = \frac{-4}{0^+} = -\infty$

الف) $\lim_{x \rightarrow -3} \lfloor -x \rfloor - \lfloor 5x \rfloor = \lim_{x \rightarrow -3^+} \lfloor -x \rfloor - \lfloor 5x \rfloor = 1 - (-15) = 16$
 $\lim_{x \rightarrow -3^-} \lfloor -x \rfloor - \lfloor 5x \rfloor = 9 - (-17) = 26$

ب) $\lim_{x \rightarrow (-\frac{1}{2})^-} \lfloor \frac{1}{x^2} \rfloor = -19$

$x < -\frac{1}{2} \Rightarrow x^2 > \frac{1}{4} \Rightarrow \frac{1}{x^2} < 4 \Rightarrow \lfloor \frac{1}{x^2} \rfloor < 4$

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



$y' = 6x^2 - 6x = -6x(x-1)$

x	-1	0	1
y'	+	0	-
y	↗	↘	↗

ب) $\lim_{x \rightarrow 0} [2x^3 - 3x^2 + 3] = \begin{cases} x \rightarrow 0^+ & [3^+] = 3 \\ x \rightarrow 0^- & [3^-] = 3 \end{cases}$

ا) $\lim_{x \rightarrow 2} \frac{|x^3 - 1|}{x^2 - 2} = \begin{cases} x \rightarrow 2^+ & \frac{x^3 - 1}{x^2 - 2} = \lim_{x \rightarrow 2^+} \frac{(x-1)(x^2 + x + 1)}{(x-2)(x+2)} = \frac{1}{2} = 0.5 \\ x \rightarrow 2^- & \frac{-(x^3 - 1)}{x^2 - 2} = -\frac{1}{2} = -0.5 \end{cases}$

ب) $\lim_{x \rightarrow \pi} \frac{|\sin x|}{\sin 2x} = \begin{cases} x \rightarrow \pi^+ & \frac{-\sin x}{2 \sin x \cos x} = \frac{1}{2} \\ x \rightarrow \pi^- & \frac{\sin x}{2 \sin x \cos x} = -\frac{1}{2} \end{cases}$

ا) $\lim_{x \rightarrow \frac{\pi}{2}} \sqrt{\cos x} = \begin{cases} x \rightarrow \frac{\pi}{2}^+ & \sqrt{0^+} = 0 \\ x \rightarrow \frac{\pi}{2}^- & \sqrt{0^-} = 0 \end{cases}$

ب) $\lim_{x \rightarrow 0} \sqrt{x - 2\sqrt{x}} = \begin{cases} x \rightarrow 0^+ & \lim_{x \rightarrow 0^+} \sqrt{(x-1)^2 - 1} = \sqrt{1-1} = 0 \\ x \rightarrow 0^- & \lim_{x \rightarrow 0^-} \sqrt{0 - 2\sqrt{x}} = 0 \end{cases}$

ا) $\lim_{x \rightarrow 0^+} \frac{(-1)^{\sin x}}{x^3 - x^2} = \frac{(-1)^0}{x^3 - x^2} = \frac{1}{x^3 - x^2} = \frac{1}{x^2(x-1)} = \frac{1}{0^-} = -\infty$

ب) $\lim_{x \rightarrow 2} \frac{x^2 - [x^2]}{x - [x]} = \begin{cases} x \rightarrow 2^+ & \frac{x^2 - 2}{x - 2} = x + 2 = 4 \\ x \rightarrow 2^- & \frac{x^2 - 1}{x - 1} = \frac{1}{1} = 1 \end{cases}$

ا) $y = 2x^3 - 3x^2 + 3$
 $y' = 6x^2 - 6x = 6x(x-1)$



x	-1	0	1
y'	-	0	+
y	↘	↗	↘

$y' = 6x^2 - 6x = 6x(x-1)$

x	-1	0	1
y'	-	0	+
y	↘	↗	↘

