

(الف) $\lim_{n \rightarrow 2^+} \frac{2n+5}{n+1} = \frac{2 \times 2 + 5}{2+1} = \frac{9}{3} = 3$ (ج) $\lim_{n \rightarrow 2^-} \frac{2n+5}{n+1} = \frac{9}{3} = 3$ (1)

(ب) $\lim_{n \rightarrow 2} \frac{2n+5}{n+1} = \frac{9}{3} = 3$ (د) $\lim_{n \rightarrow 0} \frac{1n+7}{[n^2]} = \frac{7}{[0^+]} = \frac{7}{0} = \infty$ (2)

(الف) $\lim_{n \rightarrow 2^-} 4[n]-2 = 4 \times 2 - 2 = 6$ (ج) $\left[\lim_{n \rightarrow 2^-} 4n - 2 \right] = [6] = 6$

(ب) $\lim_{n \rightarrow 2^+} [4n-2] = [6^+] = 7$ (د) $\left[\lim_{n \rightarrow 2^+} 4n - 2 \right] = [6] = 6$

(الف) $\lim_{n \rightarrow 2^-} \frac{3[n]+1}{2} = \frac{3 \times 2 + 1}{2} = \frac{7}{2}$ (ج) $\left[\lim_{n \rightarrow 2^-} \frac{3n+1}{2} \right] = [3.5] = 3$

(ب) $\lim_{n \rightarrow 2^+} \left[\frac{3n+1}{2} \right] = [3.5^+] = 4$ (د) $\left[\lim_{n \rightarrow 2^+} \frac{3n+1}{2} \right] = [4] = 4$

(الف) $\lim_{n \rightarrow 1} \frac{n-5}{n^2-4n+5} \rightarrow \frac{1-5}{1-4+5} = \frac{-4}{2} = -2$ (ج) $\frac{n-5}{n^2-4n+5} \rightarrow \frac{-4}{0^+} = -\infty$ (5)

از این فرم $\frac{0}{0}$ به روش ل'Hôpital

(ب) $\lim_{n \rightarrow 3} \frac{n-4}{n^2-4n+9} = \lim_{n \rightarrow 3} \frac{n-4}{(n-3)^2} = \frac{3-4}{(3-3)^2} = \frac{-1}{0^+} = -\infty$

از این فرم $\frac{0}{0}$ به روش ل'Hôpital

الف) $\lim_{n \rightarrow -3} [-3n] - [2n] = \begin{cases} -3^+, [9^-] - [10^+] = 9 + 10 = 19 \\ -3^-, [9^+] - [10^-] = 9 + 14 = 23 \end{cases}$ (ح) مزداد

ب) $\lim_{n \rightarrow (-\frac{1}{2})^-} \left[\frac{-1}{n^4} \right] = \left[-14^+ \right] = -14$

$\frac{1}{n^4} \left(-\frac{1}{2} \rightarrow \frac{1}{2} \right) \rightarrow -2 \rightarrow \frac{1}{n^4} \left(14 \rightarrow -14 \right) \rightarrow -14$

الف) $\lim_{n \rightarrow 1} [4n^3 - 3n^2 + 3] \xrightarrow{\text{مشتق داخل برات}} 12n^2 - 12n = 12n(n-1)$ (د) نقد راس

$n=1 \rightarrow [3^-] = 3$

$\begin{array}{c} 0 \quad 1 \\ -1 \quad +1 \quad - \\ \downarrow \quad \uparrow \quad \downarrow \end{array}$

ب) $\lim_{n \rightarrow 0} [4n^3 - 3n^2 + 3] \xrightarrow{\text{مشتق داخل برات}} 12n^2 - 12n = -12n(n-1)$

$n=0 \rightarrow [3^+] = 3$

$\begin{array}{c} 0 \quad 1 \\ -1 \quad +1 \quad - \\ \downarrow \quad \uparrow \quad \downarrow \end{array}$

الف) $\lim_{n \rightarrow 2} \frac{n^3 - 1}{n^2 - 4} = \frac{(n-1)(n^2 + 2n + 1)}{(n-2)(n+2)} = \frac{12}{4} = 3$ (ه) مزداد

$n=2 \quad n^2=4 \quad \begin{cases} \frac{n^3-1}{n^2-4} = \frac{(n-2)(n^2+2n+4)}{(n-2)(n+2)} = \frac{12}{4} = 3 \\ \frac{-(n^3-1)}{n^2-4} = \frac{-(n-2)(n^2+2n+4)}{(n-2)(n+2)} = -\frac{12}{4} = -3 \end{cases}$

الف) $\lim_{n \rightarrow \pi} \frac{|\sin n|}{\sin 2n} = \begin{cases} \pi^+ \rightarrow \frac{-\sin n}{2 \sin n \cos n} = \frac{-1}{2 \cos n} = \frac{-1}{-2} = \frac{1}{2} \\ \pi^- \rightarrow \frac{\sin n}{2 \sin n \cos n} = \frac{1}{2 \cos n} = \frac{1}{-2} = -\frac{1}{2} \end{cases}$ (و) مزداد

الف) $\lim_{n \rightarrow \frac{\pi}{2}} \sqrt{\cos n}$ (18)

$\frac{\pi}{2}^+ \rightarrow \sqrt{0^+} = 0$ حد
 $\frac{\pi}{2}^- \rightarrow \sqrt{0^-} = \text{ت.ن}$

ب) $\lim_{n \rightarrow 0} \sqrt{n-2} \sqrt{n}$ حد

$0^+ \rightarrow \sqrt{n}(\sqrt{n}-2) = \frac{0}{+1-1+} \rightarrow \sqrt{0^-} = \text{ت.ن}$
 $0^- \rightarrow \sqrt{n} \sqrt{0^-} = \text{ت.ن}$

الف) $\lim_{n \rightarrow 0^+} \frac{(-1)^{\lfloor \sin n \rfloor}}{n^2 - n^2}$ (9)

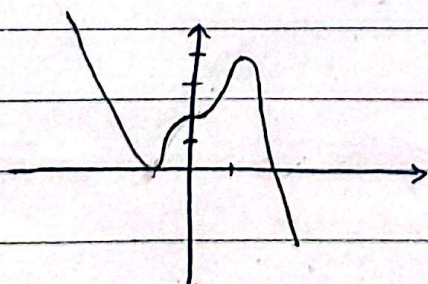
$\frac{0^+}{0^+ - 0^+} = \frac{(-1)^0}{0^-} = \frac{1}{0^-} = -\infty$ حد
 $\frac{1}{+1-1+}$

ب) $\lim_{n \rightarrow 2} \frac{n^2 - [n^2]}{n - [n]}$ حد

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

الف) $y = x^3 - 3x^2 + 2$ (10)

$\frac{0}{0} \rightarrow 1 \cdot 0 \cdot 0 - 1 \cdot 0 \cdot 0 = 1 \cdot 0 \cdot 0 (1 - 0^2)$



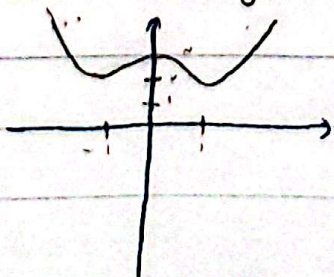
$x = -1 \rightarrow y = 0$

$x = 0 \rightarrow y = 2$

$x = 1 \rightarrow y = 0$

ب) $y = x^3 - 2x^2 + 3$ (11)

$y' = 3x^2 - 4x = 0 \rightarrow x(x - \frac{4}{3}) = 0$



$x = -1 \rightarrow y = 2$

$x = 0 \rightarrow y = 3$

$x = 1 \rightarrow y = 2$