

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

(الف)  $\lim_{n \rightarrow 2^-} 4[n]-2 = 4 \times 2 - 2 = 6$  (ج)  $\left[ \lim_{n \rightarrow 2^-} 4n - 2 \right] = [6] = 6$  (3)

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

(الف)  $\lim_{n \rightarrow 2^-} \frac{3[n]+1}{2} = \frac{3 \times 2 + 1}{2} = \frac{7}{2}$  (ج)  $\left[ \lim_{n \rightarrow 2^-} \frac{3n+1}{2} \right] = [3.5] = 3$  (5)

(ب)  $\lim_{n \rightarrow 2^+} \left[ \frac{3n+1}{2} \right] = [3.5^+] = 3$  (د)  $\left[ \lim_{n \rightarrow 2^+} \frac{3n+1}{2} \right] = [3.5] = 3$  (6)

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

(ب)  $\lim_{n \rightarrow 3} \frac{n-4}{n^2-4n+9} = \lim_{n \rightarrow 3} \frac{n-4}{(n-3)^2} = \frac{3-4}{0^+} = \frac{-1}{0^+} = -\infty$  (د)  $\frac{n-4}{n^2-4n+9} = \frac{-1}{0^+} = -\infty$  (8)

الف)  $\lim_{n \rightarrow -3} [-3n] - [2n] = \begin{cases} -3^+, [9^-] - [10^+] = 9 - 10 = -1 \\ -3^-, [9^+] - [10^-] = 9 - 10 = -1 \end{cases}$  (5) ✓ (5)

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

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

ج)  $\lim_{n \rightarrow 1} [4n^3 - 3n^2 + 3] = 12n^2 - 12n^3 = 12n(n-1)$  (4) ✓

$y = 4n^3 - 3n^2 + 3 \rightarrow y' = 12n^2 - 12n^3 \xrightarrow{y'=0} 12n^2(1-n) = 0 \rightarrow \begin{cases} n=0 \\ n=1 \end{cases}$  نقاراس

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

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

$\lim_{n \rightarrow 0^+} [3^+] = 3$  نقاراس

$\lim_{n \rightarrow 0^-} [3^+] = 3$

د)  $\lim_{n \rightarrow 0} [4n^3 - 3n^2 + 3] = 12n^2 - 12n^3 = 12n(n-1)$  (4) ✓

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

$\lim_{n \rightarrow 0^+} [3^+] = 3$  نقاراس

$\lim_{n \rightarrow 0^-} [3^+] = 3$

هـ)  $\lim_{n \rightarrow 2} \frac{|n^3 - 1|}{n^2 - 1} = \begin{cases} n=2^+, \frac{(n-1)(n^2+2n+1)}{(n-1)(n+1)} = \frac{12}{3} = 4 \\ n=2^-, \frac{-(n^3-1)}{(n^2-1)} = \frac{-(n-1)(n^2+2n+1)}{(n-1)(n+1)} = -\frac{12}{3} = -4 \end{cases}$  ✓ (4)

و)  $\lim_{n \rightarrow \pi} \frac{|\sin n|}{\sin 2n} = \begin{cases} n=\pi^+, \frac{-\sin n}{2 \sin n \cos n} = \frac{-1}{2 \cos n} = \frac{-1}{-2} = \frac{1}{2} \\ n=\pi^-, \frac{\sin n}{2 \sin n \cos n} = \frac{1}{2 \cos n} = \frac{1}{-2} = -\frac{1}{2} \end{cases}$  ✓ (4)

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

$\frac{\pi}{2}^+ \rightarrow \sqrt{0^+} = 0$   
 $\frac{\pi}{2}^- \rightarrow \sqrt{0^-} = \text{تین}$

حدیہ ✓

(۱۸)

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

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

حدیہ ✓

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

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

حدیہ ✓

(۹)

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

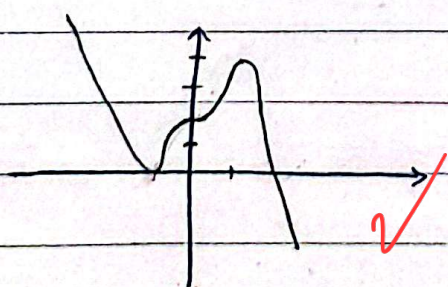
$2^+ \rightarrow \frac{n^2 - 4}{n - 2} = \frac{(n-2)(n+2)}{(n-2)} = n$   
 $2^- \rightarrow \frac{n^2 - 4}{n - 1} = \frac{1}{1} = 1$

حدیہ ✓

الف)  $y = x^3 - 3x^2 + 2$  مستقیم  $\rightarrow 1 \text{ یا } 0 \text{ یا } -1$

$1 \text{ یا } 0 \text{ یا } -1 \rightarrow 1 \text{ یا } 0 \text{ یا } -1$

(۱۰)



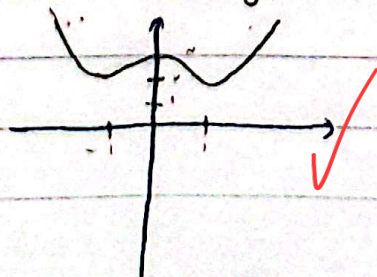
$x = -1 \rightarrow y = 0$

$x = 0 \rightarrow y = 2$

$x = 1 \rightarrow y = 0$

ب)  $y = x^3 - 3x^2 + 2 \rightarrow y' = 3x^2 - 6x = 6x(x-1)$

$-1 \quad 0 \quad 1$   
 $- \quad + \quad - \quad +$



$x = -1 \rightarrow y = 2$

$x = 0 \rightarrow y = 2$

$x = 1 \rightarrow y = 2$