

الف) $\lim_{n \rightarrow r^+} \frac{r_n + \delta}{n+1} \Rightarrow \frac{r(r) + \delta}{(r)+1} = \frac{q}{r} = \textcircled{1}$ ۱/۵

ب) $\lim_{n \rightarrow r^-} \frac{r_n + \delta}{n+1} \Rightarrow \frac{r(r) + \delta}{(r)+1} = \frac{q}{r} = \textcircled{1}$ ۱/۵

ج) $\lim_{n \rightarrow r} \frac{r_n + \delta}{n+1} \Rightarrow \frac{r(r) + \delta}{(r)+1} = \frac{q}{r} = \textcircled{1}$ ۱/۵

د) $\lim_{n \rightarrow 0} \frac{r_n + V}{[n^r]} \rightarrow n \rightarrow 0^+ = \frac{r(0^+) + V}{[0^+]} = \frac{V^+ + \textcircled{+0}}{[0^+]} = \frac{V^+}{0^+} = \textcircled{+0}$
 $\rightarrow n \rightarrow 0^- = \frac{r(0^-) + V}{[0^-]} = \frac{V^- + \textcircled{+0}}{[0^-]} = \frac{V^-}{0^-} = \textcircled{+0}$
 $\Rightarrow \frac{r(0^-) + V}{[0^-]} = \frac{V^-}{[0^-]} = \textcircled{+0}$

نکته: خارج صفر دقت می‌شود
 برای آنجا که داخل صفر است
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نکته: $\lim_{n \rightarrow 0} \frac{r_n + V}{[n^r]} = \lim_{n \rightarrow 0} \frac{r(0) + V^0}{[0]} = \frac{r(0) + V^0}{[0]}$

الف) $\lim_{n \rightarrow r^-} f[n] - r \Rightarrow f[r^-] - r = \textcircled{1}$ ۱/۵

ب) $\lim_{n \rightarrow r^-} [f_n - r] = [f(r^-) - r] = [1^-] = \textcircled{1}$ ۱/۵

ج) $\lim_{n \rightarrow r^-} [f_n - r] \Rightarrow [\lim_{n \rightarrow r^-} f_n - r] = [1^-] = \textcircled{1}$ ۱/۵

د) $\lim_{n \rightarrow r^+} [f(r^+) - r] = [\lim_{n \rightarrow r^+} f(r^+) - r] = [1^+] = \textcircled{1}$ ۱/۵

الف) $\lim_{n \rightarrow r^-} \frac{r^n + 1}{r} \Rightarrow \frac{r[r^n] + 1}{r} \Rightarrow \lim_{n \rightarrow r^-} \frac{r^n}{r} = \textcircled{1}$ ۱/۵

ب) $\lim_{n \rightarrow r^-} \left[\frac{r^n + 1}{r} \right] \Rightarrow \lim_{n \rightarrow r^-} \left[\frac{r^n}{r} + \frac{1}{r} \right] = \textcircled{1}$ ۱/۵

ج) $\lim_{n \rightarrow r^-} \left[\frac{r^n + 1}{r} \right] = \left[\lim_{n \rightarrow r^-} \frac{r^n + 1}{r} \right] = \textcircled{1}$ ۱/۵

د) $\lim_{n \rightarrow r^+} \left[\frac{r^n + 1}{r} \right] = \left[\lim_{n \rightarrow r^+} \frac{r^n + 1}{r} \right] = \textcircled{1}$ ۱/۵

الف) $\lim_{n \rightarrow 1} \frac{n - \delta}{n^2 - 4n + 4} \rightarrow n \rightarrow 1^+ = \frac{1^+ - \delta}{(1^+)^2 - 4(1^+) + 4} = \frac{(1^+)^+}{0^+} = \textcircled{+0}$

$\lim_{n \rightarrow 1} \frac{n - \delta}{(n-1)(n-2)} \rightarrow n \rightarrow 1^+ = \frac{1^+ - \delta}{(1^+ - 1)(1^+ - 2)} = \frac{(1^+)^+}{0^+ \cdot (-1)^+} = \textcircled{-0}$

$\lim_{n \rightarrow 1} \frac{n - \delta}{(n-1)(n-2)} \rightarrow n \rightarrow 1^- = \frac{1^- - \delta}{(1^- - 1)(1^- - 2)} = \frac{(1^-)^-}{0^- \cdot (-1)^-} = \textcircled{+0}$

ب) $\lim_{n \rightarrow r} \frac{n - 1^r}{n^2 - 4n + 4} \rightarrow n \rightarrow r^+ = \frac{r^+ - 1^r}{(r^+)^2 - 4(r^+) + 4} = \frac{(r^+)^+}{0^+} = \textcircled{+0}$

$\rightarrow n \rightarrow r^- = \frac{r^- - 1^r}{(r^-)^2 - 4(r^-) + 4} = \frac{(r^-)^-}{0^-} = \textcircled{-0}$

الف) $\lim_{n \rightarrow -r} [-r_n] - [\delta n] \Rightarrow n \rightarrow (-r)^+ = [-r(-r)^+] - [\delta(-r)^+] = \textcircled{1}$ ۱/۵

$n \rightarrow (-r)^- = [-r(-r)^-] - [\delta(-r)^-] = \textcircled{1}$ ۱/۵

ب) $\lim_{n \rightarrow (-\frac{1}{r})} \left[\frac{-1}{n^r} \right] = \textcircled{-19}$ ۱/۵

$\lim_{n \rightarrow (-\frac{1}{r})} \left[\frac{-1}{n^r} \right] = \frac{-1}{(-\frac{1}{r})^r} = \frac{-1}{(-1)^r} = \textcircled{-19}$

$n < -\frac{1}{r} \rightarrow n^r > \frac{1}{r} \rightarrow -n^r < -\frac{1}{r} \rightarrow -\frac{1}{n^r} > -19$

الف) $\lim_{n \rightarrow 1} [f_n^r - f_n^r + r]$ $\rightarrow n \rightarrow 1^+ \Rightarrow \text{محدد} \Rightarrow [f(1)^r - r(1)^r + r] = 1$
 $\rightarrow n \rightarrow 1^- \Rightarrow [f(1)^r - r(1)^r + r] = 1$ ✓

ب) $\lim_{x \rightarrow 0} [f_x^r - f_x^r + r] = \begin{cases} \lim_{x \rightarrow 0^+} [r^+] = r \\ \lim_{x \rightarrow 0^-} [r^-] = r \end{cases}$ 1

الف) $\lim_{n \rightarrow r} \frac{|n^r - 1|}{n^r - 1}$ $\rightarrow n \rightarrow r^+ \Rightarrow \frac{|n^r - 1|}{n^r - 1} = \frac{0^+}{0^+} \Rightarrow \text{محدد} \Rightarrow \frac{n^r - 1}{n^r - 1} = 1$

ب) $\lim_{n \rightarrow \pi} \frac{|\sin n|}{\sin n}$ $\rightarrow n \rightarrow \pi^- \Rightarrow \frac{|\sin n|}{\sin n} = \frac{0^+}{0^+} \Rightarrow \text{محدد} \Rightarrow \frac{\sin n}{\sin n} = 1$
 $\rightarrow n \rightarrow \pi^+ \Rightarrow \frac{|\sin n|}{\sin n} = \frac{0^+}{0^-} \Rightarrow \text{محدد} \Rightarrow \frac{-\sin n}{\sin n} = -1$
 $\Rightarrow \frac{-\sin n}{\sin n} = \frac{1}{\cos n} = \frac{1}{\cos(\pi)} = -1$ 2

الف) $\lim_{x \rightarrow \frac{\pi}{2}} \sqrt{\cos x}$ $\rightarrow x \rightarrow \frac{\pi}{2}^+ \Rightarrow \lim \sqrt{\cos(\frac{\pi}{2})^+} = \lim \sqrt{0^+} = 0$ ✓
 $\rightarrow x \rightarrow \frac{\pi}{2}^- \Rightarrow \lim \sqrt{\cos(\frac{\pi}{2})^-} = \lim \sqrt{0^-} = \text{تكون}$

$x - \sqrt{x} \geq 0 \rightarrow \sqrt{x}(\sqrt{x} - 1) \geq 0 \rightarrow \frac{1}{1} \rightarrow x \geq 1 \leq x \leq 0$ 1,5

ب) $\lim_{n \rightarrow 0} \sqrt{n - 2\sqrt{n}}$ $\rightarrow n \rightarrow 0^+ \Rightarrow \sqrt{0^+ - 2\sqrt{0^+}} = \sqrt{0^+} = 0$
 $\lim_{x \rightarrow 0} \sqrt{x - 2\sqrt{x}} = \text{محدد}$ $\rightarrow n \rightarrow 0^- \Rightarrow \sqrt{0^- - 2\sqrt{0^-}} = \text{تكون}$

الف) $\lim_{n \rightarrow 0^+} \frac{(-1)^{[n]} [\sin n]}{n^r - n^r} \rightarrow \frac{(-1)^{[n]} [\sin n]}{0^+} = \frac{(-1)^0}{0^+} = \frac{1}{0^+} = \infty$ 40

ب) $\lim_{n \rightarrow r} \frac{n^r - [n^r]}{n - [n]}$ $\rightarrow n \rightarrow r^+ = \frac{r^+ - [r^+]}{r - [r]} = \frac{0^+}{0^+} = \frac{0^+}{0^+} = 1$
 $\rightarrow n \rightarrow r^- = \frac{r^- - [r^-]}{r - [r]} = \frac{0^-}{0^-} = \frac{0^-}{0^-} = 1$

الف) $\lim_{n \rightarrow 1} \frac{f_n^r - f_n^r}{n^r - n^r} \Rightarrow y' = 1 \cdot f_n^r \cdot \frac{1}{n^r} = \frac{f_n^r}{n^r} = \frac{1}{n^r} = \frac{1}{1} = 1$ 1,5

ب) $y = n^r \cdot f_n^r + r \Rightarrow y' = f_n^r \cdot \frac{1}{n^r} + r = \frac{f_n^r}{n^r} + r = \frac{1}{n^r} + r = \frac{1}{1} + r = 1 + r = 1$