

الف)  $\lim_{x \rightarrow r^+} f(x) - r = \Delta \iff \lim_{x \rightarrow r^+} f(x) = r + \Delta$

ب)  $\lim_{x \rightarrow r^-} f(x) - r = \Delta \iff \lim_{x \rightarrow r^-} f(x) = r + \Delta$

الف)  $\lim_{x \rightarrow r^+} \frac{f(x) - r}{r} = \Delta$

ب)  $\lim_{x \rightarrow r^-} \frac{f(x) - r}{r} = \Delta$

الف)  $\lim_{x \rightarrow r^+} [f(x) - r] = \lim_{x \rightarrow r^+} [f(x) + r - r] = [\Delta + r] = \Delta$

ب)  $\lim_{x \rightarrow r^-} [f(x) - r] = [\Delta] = \Delta$

الف)  $\left[ \lim_{x \rightarrow r^+} f(x) - r \right] = [\Delta] = \Delta$

ب)  $\left[ \lim_{x \rightarrow r^-} f(x) - r \right] = [\Delta] = \Delta$

الف)  $\lim_{x \rightarrow r^+} \frac{f(x) - r}{x - r} \begin{cases} \xrightarrow{r^+} \frac{q^+}{0^+} = +\infty \\ \xrightarrow{r^-} \frac{q}{0^-} = -\infty \end{cases}$

ب)  $\lim_{x \rightarrow r^-} \frac{f(x) - r}{(x - r)^2} \begin{cases} \xrightarrow{r^+} \frac{q}{(0^+)^2} = \frac{q}{0^+} = +\infty \\ \xrightarrow{r^-} \frac{q}{(0^-)^2} = \frac{q}{0^+} = +\infty \end{cases}$

الف)  $\lim_{x \rightarrow r^+} \frac{f(x) - r}{\sqrt{x - r}} \begin{cases} \xrightarrow{r^+} \frac{q}{\sqrt{0^+}} = \frac{q}{0^+} = +\infty \\ \xrightarrow{r^-} \frac{q}{\sqrt{0^-}} = \frac{q}{0^+} = +\infty \end{cases}$

ب)  $\lim_{x \rightarrow r^-} \frac{f(x) - r}{\sqrt{x^2 - 2x + r}} \begin{cases} \xrightarrow{r^+} \frac{q}{\sqrt{0^+}} = \frac{q}{0^+} = +\infty \\ \xrightarrow{r^-} \frac{q}{\sqrt{0^-}} = \frac{q}{0^+} = +\infty \end{cases}$

الف)  $\lim_{x \rightarrow r^+} \frac{f(x) - r}{x^2 - \sqrt{x+1}} \begin{cases} \xrightarrow{r^+} \frac{q}{0^-} = -\infty \\ \xrightarrow{r^-} \frac{q}{0^+} = +\infty \end{cases}$

ب)  $\lim_{x \rightarrow r^-} \frac{f(x) - r}{[x - r]^2} \begin{cases} \xrightarrow{r^+} \frac{q}{[0^+]^2} = \frac{q}{0^+} = +\infty \\ \xrightarrow{r^-} \frac{q}{[0^-]^2} = \frac{q}{0^+} = +\infty \end{cases}$

الف)  $\lim_{x \rightarrow r^+} [f(x)] + [r] \begin{cases} \xrightarrow{r^+} [q^+] + [r] = r \\ \xrightarrow{r^-} [q] + [r] = r \end{cases}$

ب)  $\lim_{x \rightarrow r^-} [-\infty] + [r] \begin{cases} \xrightarrow{r^+} [-\infty] + [r] = r \\ \xrightarrow{r^-} [-\infty] + [r] = r \end{cases}$

الف)  $\lim_{x \rightarrow r^+} [x - r] \begin{cases} \xrightarrow{r^+} [-\infty] = -\infty \\ \xrightarrow{r^-} [-\infty] = -\infty \end{cases}$

ب)  $\lim_{x \rightarrow r^-} [4x - x^2] = A \begin{cases} \xrightarrow{r^+} [q^-] = A \\ \xrightarrow{r^-} [q^-] = A \end{cases}$

الف)  $\lim_{x \rightarrow r^+} \frac{|x - r|}{x^2 - \sqrt{x+1}} \begin{cases} \xrightarrow{r^+} \frac{1}{0^-} = -\infty \\ \xrightarrow{r^-} \frac{1}{0^+} = +\infty \end{cases}$

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Consider

$$\lim_{n \rightarrow \infty} \frac{x - [x]}{x^{n+1}}$$

$$\lim_{n \rightarrow \infty} \frac{x - 1}{x^{n+1}} = \frac{1}{x+1} - 2 \frac{1}{x}$$

$$\frac{0}{0}$$

$$\lim_{n \rightarrow \infty} \frac{x}{x^{n+1}} = 2 \frac{1}{0} \rightarrow \infty$$

$$(0/0)^{\infty} \rightarrow 2 \frac{1}{0} \rightarrow \infty$$