

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

$\lim_{x \rightarrow r^+} f(x^+) - r = \infty$

ب)  $\lim_{x \rightarrow r^-} f(x-r) = \infty$  ✓

$\lim_{x \rightarrow r^-} f(x^-) - r = \infty$

(۲)  
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الف)  $\lim_{x \rightarrow r^+} f[x-r] = \infty$  ✓

$= f[r^+] - r = f(r) - r = \infty$

ب)  $\lim_{x \rightarrow r^-} f[x-r] = 1$  ✓

$f[r^-] - r = f(1) - r = 1$

(۲)  
۲

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

$= [f(r^+) - r] = [\infty^+] = \infty$  ✓

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

$= [f(r^-) - r] = [\infty^-] = \infty$  ✓

(۲)  
۳

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

$\lim_{x \rightarrow r^+} f(x-r) = \infty$

$[\infty] = \infty$

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

$\lim_{x \rightarrow r^-} f(x-r) = \infty$

$\rightarrow [\infty] = \infty$

(۲)  
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الف)  $\lim_{x \rightarrow r} \frac{f(x-r)}{x-r}$

$\begin{matrix} r^+ & \rightarrow & \frac{9}{0^+} = +\infty \\ & & \checkmark \\ r^- & \rightarrow & \frac{9}{0^-} = -\infty \end{matrix}$

ب)  $\lim_{x \rightarrow r} \frac{f(x-r)}{(x-r)^2}$

$\begin{matrix} r^+ & \rightarrow & \frac{9}{0^+} = +\infty \\ & & \checkmark \\ r^- & \rightarrow & \frac{9}{0^-} = +\infty \end{matrix}$

(۲)  
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الف)  $\lim_{x \rightarrow c} \frac{x^2 - c^2}{\sqrt{x} - c}$

$x^+$   $\frac{a}{\sqrt{0^+}} = +\infty$  ✓  
 $x^-$   $\frac{a}{\sqrt{0^-}} = 0^+$  ✓

ب)  $\lim_{x \rightarrow c} \frac{x^2 - c^2}{\sqrt{x^2 - c^2}}$  →  $\frac{+}{+} = +$  ✓

$x^+$   $\frac{a}{\sqrt{0^+}} = +\infty$  ✓  
 $x^-$   $\frac{a}{\sqrt{0^-}} = 0^+$  ✓

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الف)  $\lim_{x \rightarrow c} \frac{x^2 - c^2}{x^2 - \sqrt{x} + 1}$  →  $\frac{(x-c)(x+c)}{+ \frac{+}{-} +}$

$x^+$   $\frac{a}{0^-} = -\infty$  ✓  
 $x^-$   $\frac{a}{0^+} = +\infty$  ✓

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

$x^+$   $\frac{a}{[0^+]} = \frac{a}{0} = 0^+$  ✓  
 $x^-$   $\frac{a}{[0^-]} = \frac{a}{-1} = -a$  ✓

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الف)  $\lim_{n \rightarrow r} [rn] + [-rn]$

$x^+$   $[\frac{a}{q}] + [-\frac{a}{-q}] = r$  ✓  
 $x^-$   $[\frac{a}{q}] + [-\frac{a}{-q}] = r$  ✓

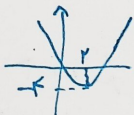
ب)  $\lim_{n \rightarrow -r} [-rn] + [rn]$

$x^+$   $[\frac{a}{-q}] + [-\frac{a}{q}] = 11$  ✓  
 $x^-$   $[\frac{a}{-q}] + [-\frac{a}{q}] = 11$  ✓

2

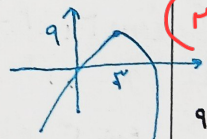
الف)  $\lim_{x \rightarrow c} [x^2 - c^2]$

$x^+$   $[-c^+] = -c$  ✓  
 $x^-$   $[-c^+] = -c$  ✓



ب)  $\lim_{x \rightarrow c} [4x - x^2]$

$x^+$   $[a] = 1$  ✓  
 $x^-$   $[a^-] = 1$  ✓



2

الف)  $\lim_{x \rightarrow r} \frac{|x - r|}{x^2 - r^2 + r}$

$x^+$   $\frac{+(x-r)}{(x-r)(x+r)} = \frac{1}{x+r} = 1$  ✓  
 $x^-$   $\frac{-(x-r)}{(x-r)(x+r)} = \frac{-1}{x+r} = -1$  ✓

ب)  $\lim_{x \rightarrow 1} \frac{x - [x]}{x^2 - 1}$

$x^+$   $\frac{x - 1}{(x-1)(x+1)} = \frac{1}{x+1} = \frac{1}{2}$  ✓  
 $x^-$   $\frac{x}{x^2 - 1} = \frac{1}{0^-} = -\infty$  ✓

$\frac{-1^k + 1}{+ \frac{+}{-} +}$

2

1/2 ✓