

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

$f(r) - r = (d)$ ✓

1- ب) $\lim_{x \rightarrow r^-} f(x) - r$ $f(r) - r = (d)$ ✓ (2)

2- الف) $\lim_{n \rightarrow r^+} f[n] - r$

$f[r^+] - r = f(r) - r = (d)$ ✓

2- الف) $\lim_{x \rightarrow r^-} f[x] - r$ $f[r^-] - r = f(r) - r = (d)$ ✓ (2)

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

$[f(r^+) - r] = [d^+] = (d)$ ✓

3- ب) $\lim_{x \rightarrow r^-} [f(x) - r]$ $[f(r^-) - r] = [d^-]$ ✓ (2)

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

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

4- ب) $\lim_{x \rightarrow r^-} [f(x) - r]$ $\lim_{x \rightarrow r^-} f(x) - r = f(r) - r = d$
 $[\lim_{x \rightarrow r^-} f(x) - r] = [d] = (d)$ ✓ (2)

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

$\frac{r^+}{0^+} = \frac{q}{0^+} = (+\infty)$
 $\frac{r^-}{0^-} = \frac{q}{0^-} = (-\infty)$ ✓

5- ب) $\lim_{x \rightarrow r} \frac{f(x) - r}{(x - r)^2}$ $\frac{r^+}{(0^+)^2} = \frac{q}{0^+} = (+\infty)$
 $\frac{r^-}{(0^-)^2} = \frac{q}{0^+} = (+\infty)$ ✓ (2)

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

$\frac{r^+}{0^+} = \frac{q}{0^+} = (+\infty)$
 $\frac{r^-}{\sqrt{0^-}} = \frac{q}{\sqrt{0^-}} = (-\infty)$ ✓

6- ب) $\lim_{x \rightarrow r} \frac{f(x) - r}{\sqrt{x^2 - r^2}}$ $\frac{r^+}{0^+} = \frac{q}{0^+} = (+\infty)$
 $\frac{r^-}{\sqrt{0^-}} = \frac{q}{\sqrt{0^-}} = (-\infty)$ ✓ (2)

7- الف) $\lim_{x \rightarrow r} \frac{f(x) - r}{x^2 - \sqrt{x} + 1}$

$\frac{r^+}{0^+} = \frac{q}{0^+} = (-\infty)$
 $\frac{r^-}{0^+} = \frac{q}{0^+} = (+\infty)$ ✓

7- ب) $\lim_{x \rightarrow r} \frac{f(x) - r}{[x - r]}$ $\frac{r^+}{[0^+]} = \frac{q}{0} = (-\infty)$
 $\frac{r^-}{[0^-]} = \frac{q}{-1} = (-q)$ ✓ (2)

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

$\frac{r^+}{[q, r]} + [-q, r] = q + (-q) = (0)$ ✓
 $\frac{r^-}{[q, r]} + [-q, r] = q + (-q) = (0)$ ✓

8- ب) $\lim_{x \rightarrow -4} [-f(x) + [f(x)]]$ $\frac{-4^+}{[2, 4] + [-11, 8]} = \frac{-4^+}{22 - 12} = (10)$ ✓ (2)
 $\frac{-4^-}{[2, 4] + [-11, 8]} = \frac{-4^-}{24 - 13} = (11)$ ✓

9- الف) $\lim_{x \rightarrow r} [x^2 - f(x)]$

$\frac{r^+}{[(r^+)(r^+ - f)]} = 1$
 $[(r^+)(-r^+)] = [(-r^2)] = (-r^2)$ ✓
 $\frac{r^-}{[(r^-)(r^- - f)]} = 1$
 $[(r^-)(-r^-)] = [(-r^2)] = (-r^2)$ ✓

9- ب) $\lim_{x \rightarrow r} [4x - x^2]$ $\frac{r^+}{[(4r^+)(4 - r^+)]} = (4)$ ✓ (2)
 $[(4r^+)(r^-)] = [4r^-] = (4)$ ✓
 $\frac{r^-}{[(4r^-)(4 - r^-)]} = 1$
 $[(4r^-)(r^+)] = [4r^+] = (4)$ ✓

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

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

10- ب) $\lim_{n \rightarrow 1} \frac{n - [n]}{n^2 - 1}$ $\frac{1^+}{\frac{n - 1}{(n - 1)(n + 1)}} = \frac{1}{n + 1}$ ✓ (2)
 $= \frac{1}{2}$ ✓
 $\frac{1^-}{\frac{n - 1}{(n - 1)(n + 1)}} = \frac{1}{0^-} = (-\infty)$ ✓