

$$\lim_{n \rightarrow 2} \frac{2n+5}{n+1} = \frac{(2 \times 2)+5}{2+1} = \frac{9}{3} = 3 \quad \text{الف) (3)}$$

$$\lim_{n \rightarrow 2^-} \frac{2n+5}{n+1} = \frac{(2 \times 2)+5}{2+1} = \frac{9}{3} = 3 \quad \text{ب) (3)}$$

$$\lim_{n \rightarrow 2} \frac{2n+5}{n+1} = \frac{(2 \times 2)+5}{2+1} = \frac{9}{3} = 3 \quad \text{ج) (3)}$$

$$\lim_{n \rightarrow 0} \frac{2n+2}{[n]} = \frac{2}{1} = 2 \quad \text{د) (2)}$$

$$\lim_{n \rightarrow 2^-} \varepsilon[n] - 2 = \varepsilon[2^-] - 2 = 0 \quad \text{الف) (0)}$$

$$\sum) \left[\lim_{n \rightarrow 2^-} f_n - 2 \right] = \left[\lim_{n \rightarrow 2^-} f(2^-) - 2 \right] = \left[\lim_{n \rightarrow 2^-} 1 - 2 \right] = -1 \quad \text{ب) (9)}$$

$$\rightarrow \left[\lim_{n \rightarrow 2^+} f_n - 2 \right] = \left[\lim_{n \rightarrow 2^+} f(2^+) - 2 \right] = \left[\lim_{n \rightarrow 2^+} 1 - 2 \right] = -1 \quad \text{ج) (14)}$$

$$\lim_{n \rightarrow 2^-} \frac{2[n]+1}{2} = \frac{2 \times 2 + 1}{2} = \frac{5}{2} \quad \text{الف) (5)}$$

$$\lim_{n \rightarrow 2^-} \left[\frac{2n+1}{2} \right] = \left[\frac{2 \times 2 + 1}{2} \right] = \left[\frac{5}{2} \right] = 2 \quad \text{ب) (5)}$$

$$\left[\lim_{n \rightarrow 2^-} \frac{2n+1}{2} \right] = \frac{2 \times 2 + 1}{2} = 2 \quad \text{ج) (6)}$$

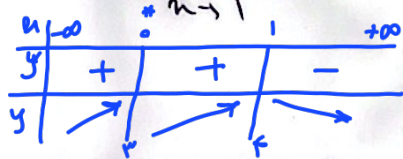
$$\left[\lim_{n \rightarrow 2^-} \frac{2n+1}{2} \right] = \frac{2 \times 2 + 1}{2} = 2 \quad \text{د) (2)}$$

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

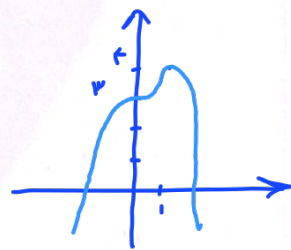
$$\text{ب) } \lim_{n \rightarrow 2} \frac{n-5}{n^2-4n+4} = \frac{n-5}{(n-2)^2} \Rightarrow \frac{2-5}{(2^+-2)^2} = \frac{-3}{0^+} = -\infty \quad \text{ج) (4)}$$

الف) $\lim_{n \rightarrow -2} [-2n] - [2n] \xrightarrow{-2^+} [-2(-2^+)] - [2(-2^+)] = 1 + 1 = 2$ ✓ $\textcircled{1}$
 $\xrightarrow{-2^-} [-2(-2^-)] - [2(-2^-)] = 9 + 1 = 10$ ✓

الف) $\lim_{n \rightarrow 1} [2n^2 - 3n + 3] \xrightarrow{n=1^+} [2(1^+)^2 - 3(1^+) + 3] = [2] = 2$ ✓ $\textcircled{1}$ - 6
 $\xrightarrow{n=1^-} [2(1^-)^2 - 3(1^-) + 3] = [2] = 2$ ✓



ب) $\lim_{n \rightarrow 0} [2n^2 - 3n + 3] \xrightarrow{n \rightarrow 0^+} \in [1, \dots, 2] = 2$
 $\xrightarrow{n \rightarrow 0^-} \in [0, \dots, 2] = 2$



الف) $\lim_{n \rightarrow 2} \frac{|n^2 - 2|}{n^2 - 2} \xrightarrow{n \rightarrow 2^+} \frac{(n-2)(n^2 + 2n + 2)}{(n-2)(n+2)} = \frac{12}{4} = 3$ ✓
 $\xrightarrow{n \rightarrow 2^-} \frac{-(n-2)(n^2 + 2n + 2)}{(n-2)(n+2)} = -\frac{12}{4} = -3$ ✓

ب) $\lim_{n \rightarrow \pi} \frac{|\sin n|}{\sin n} \xrightarrow{n \rightarrow \pi^-} \frac{\sin n}{\sin n} = \frac{1}{0^-} = -\infty$ ✓
 $\xrightarrow{n \rightarrow \pi^+} \frac{-\sin n}{\sin n} = \frac{-1}{0^+} = -\infty$ ✓

الف) $\lim_{n \rightarrow \frac{\pi}{2}} \sqrt{\cos n} \xrightarrow{\frac{\pi}{2}^+} \sqrt{0^+} = 0$
 $\xrightarrow{\frac{\pi}{2}^-} \sqrt{0^-} = \text{تعريف نشده}$ ✓

ب) $\lim_{n \rightarrow 0} \sqrt{n - 2\sqrt{n}} \xrightarrow{n \rightarrow 0^+} \sqrt{0^+ - 2\sqrt{0^+}} = \sqrt{0^-} = \text{تعريف نشده}$ ✓
 $\xrightarrow{n \rightarrow 0^-} \sqrt{0^- - 2\sqrt{0^-}} = \sqrt{0^-} = \text{تعريف نشده}$ ✓

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

سوال 5

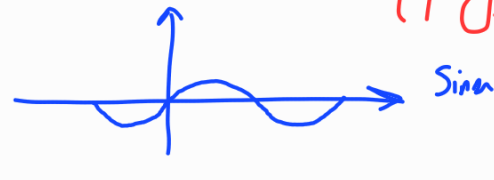
$x < -\frac{1}{4} \rightarrow x^4 > \frac{1}{14} \rightarrow -x^4 < -\frac{1}{14} \rightarrow -\frac{1}{x^4} > -14$

ب) $\lim_{x \rightarrow 0} [f(x) - f(x) + 3] = \begin{cases} \lim_{x \rightarrow 0^+} [3] = 3 \\ \lim_{x \rightarrow 0^-} [3] = 3 \end{cases}$

سوال 4

سؤال ١٩

$$\lim_{x \rightarrow 0^+} \frac{(-1)^{\lceil \sin x \rceil}}{x^x - x^x} = \lim_{x \rightarrow 0^+} \frac{(-1)^{\lceil 0^+ \rceil}}{x^x(x-1)} = \lim_{x \rightarrow 0^+} \frac{1}{0^-} = -\infty$$



سؤال ١٠

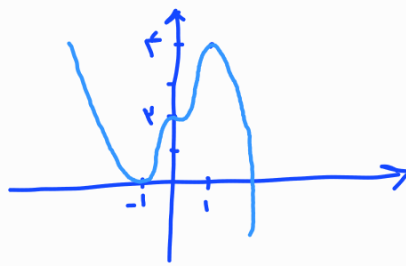
$$\lim_{x \rightarrow r} \frac{x^r - \lceil x^r \rceil}{x - \lceil x \rceil} = \begin{cases} \lim_{x \rightarrow r^+} \frac{x^r - \lceil r^+ \rceil}{x - \lceil r^+ \rceil} = \lim_{x \rightarrow r^+} \frac{x^r - r}{x - r} = \lim_{x \rightarrow r^+} x + r = r \\ \lim_{x \rightarrow r^-} \frac{x^r - \lceil r^- \rceil}{x - \lceil r^- \rceil} = \lim_{x \rightarrow r^-} \frac{x^r - r}{x - r} = \frac{r - r}{r - r} = 1 \end{cases}$$

سؤال ١٠

$$y = \omega x^3 - \frac{1}{2}x^2 + r$$

$$y' = 3\omega x^2 - x \xrightarrow{y'=0} 3\omega x^2(1-x) = 0 \rightarrow 3\omega x^2(1-x)(1+x) = 0 \rightarrow \begin{cases} x = 0 \\ x = 1 \\ x = -1 \end{cases}$$

x	-∞	-1	0	1	+∞
y'	-	+	+	-	-
y	↘	↗	↗	↘	↘



سؤال ١٠

$$y = x^r - rx^r + r$$

$$y' = rx^{r-1} - rx^r \xrightarrow{y'=0} rx(x^{r-1} - 1) = 0 \rightarrow rx(x-1)(x+1) = 0 \rightarrow \begin{cases} x = 0 \\ x = 1 \\ x = -1 \end{cases}$$

x	-∞	-1	0	1	+∞
y'	-	+	-	+	+
y	↘	↗	↘	↗	↗

