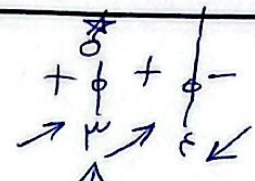


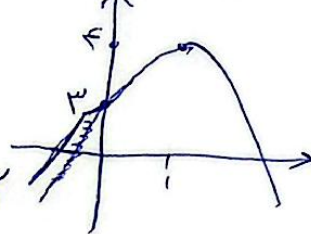
|                                                                                                                                               |                                                                                                                                                                                                                                                                                                         |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| $\lim_{x \rightarrow 2^-} \frac{x^2 + 1}{x + 1} = \frac{5}{3}$                                                                                | $\lim_{x \rightarrow 2^+} \frac{x^2 + 1}{x + 1} = \frac{5}{3}$ (الف)                                                                                                                                                                                                                                    | ۱ |
| $\lim_{x \rightarrow 0} \frac{x^2 + 1}{[x]^2} = \frac{1}{0} = \infty$                                                                         | $\lim_{x \rightarrow 2} \frac{x^2 + 1}{x + 1} = \frac{5}{3}$ (ج)                                                                                                                                                                                                                                        | ۲ |
| $\lim_{x \rightarrow 2^-} [x^2 - 2] = \lim_{x \rightarrow 2^-} [10^-] = 9$                                                                    | $\lim_{x \rightarrow 2^-} \{x\} - 2 =$<br>$\lim_{x \rightarrow 2^-} \{2^-\} - 2 = 0$                                                                                                                                                                                                                    | ۳ |
| $[\lim_{x \rightarrow 2^+} x^2 - 2] = 10$                                                                                                     | $[\lim_{x \rightarrow 2^-} x^2 - 2] = [10] = 10$ (ع)                                                                                                                                                                                                                                                    | ۴ |
| $\lim_{x \rightarrow 2^-} [\frac{x^2 + 1}{x}] = \lim_{x \rightarrow 2^-} [5^-] = 4$                                                           | $\lim_{x \rightarrow 2^-} \frac{x^2 + 1}{x} = \lim_{x \rightarrow 2^-} \frac{5^-}{2} = \frac{5}{2}$ (الف)                                                                                                                                                                                               | ۵ |
| $[\lim_{x \rightarrow 2^+} \frac{x^2 + 1}{x}] = [5] = 5$                                                                                      | $[\lim_{x \rightarrow 2^-} \frac{x^2 + 1}{x}] = [5] = 5$ (ج)                                                                                                                                                                                                                                            | ۶ |
| $\lim_{x \rightarrow 2} \frac{x - 5}{x^2 - 5x + 9} = \lim_{x \rightarrow 2} \frac{x - 5}{(x - 2)^2} = \frac{-1}{0^+} = -\infty$               | $\lim_{x \rightarrow 1} \frac{x - 5}{x^2 - 5x + 9} = \frac{-4}{0} = \infty$ (الف)<br>$\lim_{x \rightarrow 1} \frac{x - 5}{(x - 1)(x - 1)} = \begin{cases} 0^+ \rightarrow \lim_{x \rightarrow 1} \frac{1}{0^+} = +\infty \\ 1^- \rightarrow \lim_{x \rightarrow 1} \frac{1}{0^-} = -\infty \end{cases}$ | ۷ |
| $\lim_{x \rightarrow (-\frac{1}{2})^-} [\frac{-1}{x^2}] = \lim_{x \rightarrow (-\frac{1}{2})^-} [\frac{-1}{(\frac{1}{4})^-}] = [-16^-] = -16$ | $\lim_{x \rightarrow -2^+} [x^2] - [-15^+] = 4 + 15 = 19$                                                                                                                                                                                                                                               | ۸ |
| $\lim_{x \rightarrow -2^-} [-x^2] - [15x] =$                                                                                                  | $\lim_{x \rightarrow -2^-} [x^2] - [-15^-] = 4 + 15 = 19$                                                                                                                                                                                                                                               | ۹ |

$$y = \varepsilon x^r - r x^r + r \xrightarrow{\text{من}} y' = 1 r x^{r-1} - r x^{r-1} = 1 r x^{r-1} (1 - x)$$



الف)  $\lim_{x \rightarrow 1} [\varepsilon x^r - r x^r + r] = \lim_{x \rightarrow 1} [\varepsilon] = r$

ب)  $\lim_{x \rightarrow 0} [\varepsilon x^r - r x^r + r] = \lim_{x \rightarrow 0^+} [\varepsilon x^r - r x^r + r] = r$   
 $\lim_{x \rightarrow 0^-} [\varepsilon x^r - r x^r + r] = [r] = r$



$$\lim_{x \rightarrow r} \frac{|x^r - 1|}{x^r - \varepsilon} \xrightarrow{r^+} \lim_{x \rightarrow r^+} \frac{x^r - 1}{x^r - \varepsilon} = \lim_{x \rightarrow r^+} \frac{(x-r)(x^{r-1} + r x^{r-2} + \dots + \varepsilon)}{(x-r)(x+r)} = \frac{1}{\varepsilon} = r \quad (\text{الف})$$

$$\lim_{x \rightarrow r^-} \frac{1 - x^r}{x^r - \varepsilon} = \lim_{x \rightarrow r^-} \frac{(1-x)(x^{r-1} + r x^{r-2} + \dots + \varepsilon)}{(x-r)(x+r)} = \frac{-1}{\varepsilon} = -r$$

$$\xrightarrow{\pi^+} \lim_{x \rightarrow \pi^+} \frac{-\sin x}{r \sin x \cos x} = \frac{-1}{r \cos x} = \frac{-1}{-r} = \frac{1}{r} \quad \xrightarrow{\pi^-} \lim_{x \rightarrow \pi^-} \frac{\sin x}{-r \sin x \cos x} = -\frac{1}{r}$$

$$\lim_{x \rightarrow 0} \sqrt{x - r \sqrt{x}} \xrightarrow{0^+} \lim_{x \rightarrow 0^+} \sqrt{x - r \sqrt{x}} = \lim_{x \rightarrow 0^+} \sqrt{x} = \lim_{x \rightarrow 0^+} \sqrt{x} = 0$$

$$\lim_{x \rightarrow \frac{\pi}{2}} \sqrt{\cos x} \xrightarrow{\frac{\pi}{2}^+} \lim_{x \rightarrow \frac{\pi}{2}^+} \sqrt{0^+} = 0$$

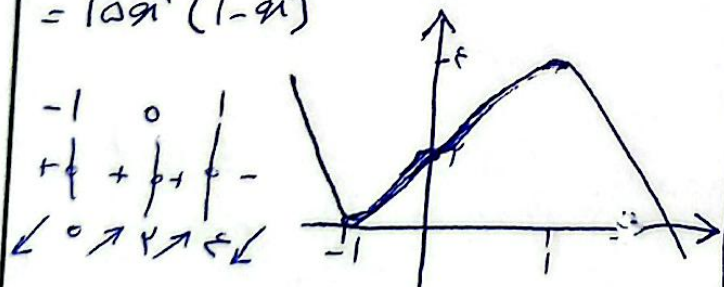
$$\lim_{x \rightarrow r} \frac{x^r - [x^r]}{x - [x]} \xrightarrow{r^+} x > r \rightarrow x^r > \varepsilon \rightarrow [x^r] = \varepsilon$$

$$\lim_{x \rightarrow 0^+} \frac{(-1) [\sin x]}{x^r - x^r} = \quad \text{الف 9}$$

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

$$\lim_{x \rightarrow r^-} \frac{x^r - r}{x - 1} = \frac{\varepsilon - r}{r - 1} = 1$$

$$y = \varepsilon x^r - r x^r + r \xrightarrow{\text{من}} y' = 1 \varepsilon x^{r-1} - r x^{r-1} = 1 \varepsilon x^{r-1} (1 - x)$$



$$y = x^r - r x^r + r \xrightarrow{\text{من}} y' = \varepsilon x^{r-1} - \varepsilon x^{r-1} = \varepsilon x (x^{r-1} - 1)$$

