

①

الف) $\frac{9}{3} = 3$ ب) $\frac{9}{3} = 3$ ج) $\frac{9}{3} = 3$

د) $\frac{7}{\underbrace{[0^+]}} = 7$

②

الف) $4[3^-] - 2 = 12 - 2 = 10$ ب) $[12^- - 2] = [10^-] = 9$

ج) $[10] = 10$ د) $[10] = 10$

③

الف) $\frac{3 \times 2 + 1}{2} = \frac{7}{2}$ ب) $\left[\frac{10^-}{2} \right] = [5^-] = 4$

ج) $[5] = 5$ د) $[5] = 5$

④

الف) $\lim_{x \rightarrow 1} \frac{x-5}{x^2-x+5}$ $\frac{1^+}{1^+} = +\infty$ $\frac{1^-}{1^-} = -\infty$

$\downarrow$
(x-5)(x-1) $\frac{1}{+} \frac{5}{-} \frac{+}{+}$

ب) $\frac{1^+}{1^+} = +\infty$ $\frac{1^-}{1^-} = -\infty$ $\frac{1}{+} \frac{5}{-} \frac{+}{+}$

⑤

الف) $\frac{-1^+}{-1^+} [9^-] - [-10^+] = 1 + 10 = 11$

ب) $\frac{-1^-}{-1^-} [9^+] - [10^-] = 9 + 10 = 19$

$$\Rightarrow x < -\frac{1}{r} \Rightarrow x^r > \frac{1}{19} \Rightarrow \frac{1}{x^r} > 19$$

$$\Rightarrow \lim_{x \rightarrow (-\frac{1}{r})^-} \left[\frac{1}{x^r} \right] = 19$$

⑤

الف) $\frac{1^+}{1^-}$ $\lim = 1x^r - 1x^r \Rightarrow \frac{0}{0} = 0$

" : $1x^r - 1x^r \Rightarrow \frac{0}{0} = -1$

⑥

$\frac{0^+}{0^+}$ $x = 1 \Rightarrow \frac{1}{1} - \frac{1}{1} + 1 = 1 \Rightarrow \left[\frac{0}{0} \right] = 1$

$\frac{0^-}{0^-}$ $x = -1 \Rightarrow \frac{1}{1} + \frac{1}{1} + 1 = 1 \Rightarrow \left[\frac{0}{0} \right] = 1$

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

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

⑦

$\frac{\pi^+}{\pi^-}$ $\frac{-\sin x}{r \sin x} = \frac{1}{r} = \frac{1}{r}$

$\frac{\sin x}{r \sin x}$ $\frac{1}{r} = \frac{1}{r}$

الف) $\frac{r^+}{r^-}$ $\cos x > 0 \Rightarrow 0$

$\frac{r^+}{r^-}$ $\cos x < 0 \Rightarrow 0$

⑧

$$\Rightarrow \frac{0^+}{0^-} = \infty$$

⑧

الف) $\frac{(-1)^0}{x^3 - x^2} = \frac{1}{0^+} = +\infty$

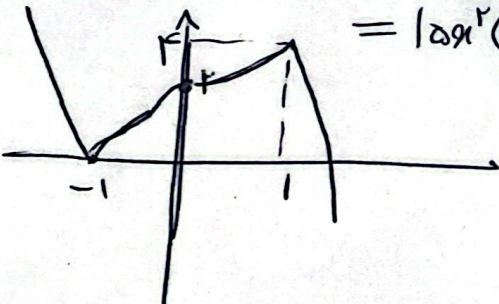
$x > 0 \Rightarrow 0 < \sin x < 1$

$\frac{0^+}{-1} = -0^+ \Rightarrow [\sin x] = 0$

$\Rightarrow \frac{r^+}{r^-} \quad x^r > r \Rightarrow [x] = r \Rightarrow \frac{x^r - r}{x - r} = \lim_{x \rightarrow r} \frac{x^r - r}{x - r} = \frac{1}{r}$

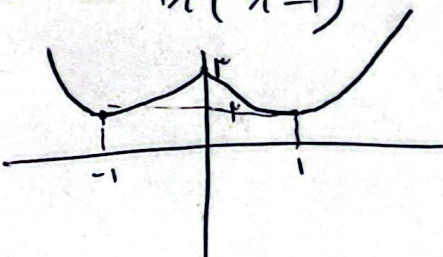
$x^r < r \Rightarrow [x] = r \Rightarrow \frac{x^r - r}{x - r} = \frac{1}{r} = 1$

الف) $\Delta x^r - r \Delta x^{r-1} \xrightarrow{\Delta x \rightarrow 0} \Delta x^r - r \Delta x^{r-1} = \Delta x^r (1 - r)$



$\frac{-1}{-} \quad \frac{0^+}{+} \quad \frac{1}{+} \quad \frac{1}{-}$

ب) $r x^r - r x = r x (x^{r-1} - 1)$



$\frac{-1}{-} \quad \frac{0}{+} \quad \frac{1}{-} \quad \frac{1}{+}$