۱۵ شوال ۱۴۴۵
۲۴ سوال ۱ ۲۰۲۴ April

الف) $\lim_{x\to 2^+} \frac{2x+5}{x+1}$ → $\frac{2(2)+5}{2+1} = 3$

ب) $\lim_{x\to 2^-} \frac{2x+5}{x+1} = \frac{2(2)+5}{2+1} = 3$

ج) $\lim_{x\to 2} \frac{2x+5}{x+1}$ جایگذاری → $\frac{2(2)+5}{2+1} = 3$

د) $\lim_{x\to 2} \frac{4x+7}{[x^2]} = \frac{4(2)+7}{[2^2]} = \frac{11}{4} = 2.75$

سوال ۴

الف) $\lim_{x\to 3^-} 2[x]-2 = 2(2)-2 = 2$

→ $x<3 \longrightarrow [3^-]=2$

ب) $\lim_{x\to 3^-} [4x-2] \Rightarrow [4(3^-)-2] = [10^-] = 9$

→ $x<3$

ج) $\left[\lim_{3^-} 4x-2\right] = 4(3^-)-2 = 10 \Rightarrow [10]=10$

سوال ② د) $\lim_{x \to 3^+} \{4x-2\} = \{4(3^+)-2\} = \{10\} = 10$

یا $[10] = 10$

سوال ③ الف) $\lim_{x \to 3^-} \frac{3[x]+1}{2} = \frac{3[3^-]+1}{2} = \frac{7}{2} = 3.5$

ب) $\lim_{x \to 3^-} \left[\frac{3x+1}{2}\right] = \frac{3(3^-)+1}{2} = 5^- \Rightarrow [5^-] = 4$

ج) $\left[\lim_{x \to 3^-} \frac{3x+1}{2}\right] \Rightarrow \frac{3(3^-)+1}{2} = 5^- \longrightarrow 5$ حذف حد

$[5^-] = 4$

$\left[\lim_{x \to 3^+} \frac{3x+1}{2}\right] = \frac{3(3^+)+1}{2} = 5^+ \Rightarrow [5^+] = 5$

سوال ④ الف) $\lim_{x \to 1} \frac{x-5}{x^2-4x+5}$

$\frac{1}{-1}$ $\rightarrow \frac{(x-5)}{(x-5)(x-1)} = \frac{1}{x-1} = \frac{1}{0^+} = +\infty$

$\frac{1}{-1}$ $\rightarrow$ مخرج پایه $= \frac{1}{x-1} = \frac{1}{0^-} = -\infty$

$\Rightarrow$ حد ندارد!

ب) $\lim_{x \to 3} \frac{x-4}{x^2-6x+9}$

3^+ $\rightarrow \frac{x-4}{(x-3)^2} = \frac{3^+-4}{(3^+-3)^2} = \frac{-1}{0^+} = -\infty$

3^- $\rightarrow \frac{x-4}{(x-3)^2} = \frac{3^--4}{(3^--3)^2} = \frac{-1}{0^+} = -\infty$

$\Leftarrow$ حد ندارد!

سوال ⑤

الف) $\lim_{x \to -3} [-3x] - [5x]$

-3^+ / -3^-

$[-3(-3^+)] - [5(-3)^+] = 9 + 14 = 23$

$[-3(-3^-)] - [5(-3)^-] = 8 + 15 = 23$

ب) $\lim_{x \to -\frac{1}{2}^-} \left[\frac{-1}{x^4}\right] = \left[\frac{-1}{(-\frac{1}{2})^4}\right] = \left[\frac{-1}{(\frac{1}{16})^-}\right] = [-16]$

$= -17$

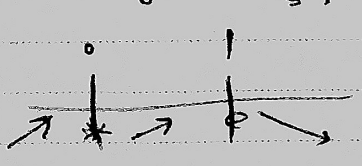
سوال ⑥

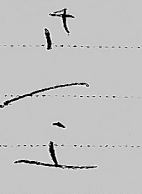
الف) $\lim_{x \to 1} [4x^3 - 3x^4 + 3]$

$\hookrightarrow [\underbrace{4 - 3 + 3}_{4}] = 4 \xrightarrow{\text{شق}} 12x^2 - 12x^3$

$\Rightarrow 12x^2(-x+1)$

$\hookrightarrow 0$ $\hookrightarrow 1$





$\Rightarrow [4^-] = 3$

ب) $\lim_{x \to 0} [4x^3 - 3x^4 + 3] \longrightarrow [0 - 0 + 3] = 3$ ریشه

$[3^+] - 3^+ = 0^+$

$[3^-] - 3^- = 0^-$

$12x^2 - 12x^3 = 0$ ← شق

(٧)

ب) $\lim_{x \to \pi} \frac{|\sin x|}{x - \pi \sin x}$

π^+

$$\frac{-\sin x}{x - \pi \sin x} = \frac{-1}{1 - \pi \cos x} = \frac{-1}{1 - \pi(-1)} = \frac{-1}{1+\pi} = -\frac{1}{4}$$

π^-

$$\frac{\sin x}{x - \pi \sin x} = \frac{1}{1 - \pi \cos x} = \frac{1}{1 - \pi(-1)} = \frac{1}{1+\pi} = \frac{1}{4}$$