پارمیس تیموری

۱) الف) $\lim_{x\to 2^+} \frac{2x+5}{x+1} \Rightarrow \frac{9}{3} = \boxed{3}$ ب) $\lim_{x\to 2^-} \frac{2x+5}{x+1} = \boxed{3}$

ج) $\lim_{x\to 2} \frac{2x+5}{x+1}$ $\nearrow x\to 2^+ = \boxed{3}$ ، $\searrow x\to 2^- = \boxed{3}$ → حد دارد → ۳

د) $\lim_{x\to 0} \frac{2x+7}{[x^2]}$ → $x\to 0^+ \to x^2 \to 0^+ \to [x^2] = 0 \to$ ت/ن
→ $x\to 0^- \to x^2 \to 0^+ \to [x^2] = 0 \to$ ت/ن

۲) الف) $\lim_{x\to 3^-} 4[x]-2 \Rightarrow 8-2=6$ / ب) $x<3 \to 4x<12 \to 4x-2<10 \to [\ ] \to 9$ /

ج) $\to 4(3)-2 \Rightarrow 12-2=10 \to [10]=10$ / د $\to 4(3)-2=10 \to [10]=10$

۳) الف] $\lim_{x\to 3^-} \frac{3[x]+1}{2} \to \frac{3(2)+1}{2} = \frac{7}{2} = \boxed{3/5}$

ب] $\lim_{x\to 3^-} \left[\frac{3x+1}{2}\right] \Rightarrow \frac{3(3)+1}{2} = \frac{10}{2} \to 5$ کمتر $\to [5^-] = 4 \to \lim 4 = 4$

ج) $\left[\lim_{x\to 3^-} \frac{3x+1}{2}\right] \Rightarrow [\lim 10] = 10$

د) $\left[\lim_{x\to 3^+} \frac{3x+1}{2}\right] \Rightarrow [\lim 10] \to [10] = 10$

۴) الف) $\lim_{x\to 1} \frac{\cancel{x-5}}{(\cancel{x-5})(x-1)} = \lim_{x\to 1} \frac{1}{x-1}$ $\nearrow x\to 1^+ \to \frac{1}{x-1 \to 0^+} = +\infty$ ، $\searrow x\to 1^- \to \frac{1}{x-1 \to 0^-} = -\infty$ } حد ندارد

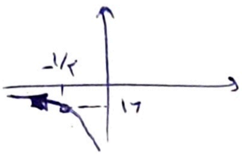
ب) $\lim_{x\to 3} \frac{x-4}{(x-3)^2}$ $\nearrow x\to 3^+ \to \frac{x-4}{(0^+)^2} = \frac{x-4}{0^+} \to - = -\infty$ ، $\searrow x\to 3^- \to \frac{x-4}{(0^-)^2} = \frac{x-4}{0^+} \to - = -\infty$ } حد دارد

۵) الف) $\lim\limits_{x\to -3} [-3x]-[5x] \longrightarrow x>-3 \Rightarrow [-3x]-[5x] = 8 - (-15) \Rightarrow \boxed{23}$

$\longrightarrow x<-3 \Rightarrow [-3x]-[5x] = 9 - (-16) = 25$

حد ندارد

ب) $\lim\limits_{x\to(-\frac{1}{2})^-} \left[\frac{-1}{x^4}\right] \to$



$x\to(-\frac{1}{2})^- \to y \to (16^-) \Rightarrow [16^-] = 15$

۶) الف) $\lim\limits_{x\to 1} [4x^3-3x^4+3] \Rightarrow f(x) = -3x^4+4x^3+3 \Rightarrow f'(x) = -12x^3+12x^2$

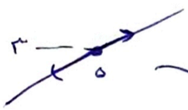
$-12x^2(x-1) \to$ $+ \;0\; + \;1\; -$ ← تغیر علامت

$\Rightarrow f(1) = -3+4+3 = 4$

$(1,4) \Longrightarrow x\to 1^+ = x\to 1^- = 4^-$

$[4^-] = 3 \Longrightarrow$ حد دارد

ب) $\lim [4x^3-3x^4+3] \Rightarrow f(x) = 4x^3-3x^4+3 \Rightarrow f'(x) = -12x^2(x-1) \Rightarrow$ $+ \;0\; + \;1\; -$



$f(0) = 3 \Rightarrow$

$x\to 0^+ \Rightarrow f(x) \to 3^+ \to [x] = 3$

$x\to 0^- \to f(x) \to 3^- \to [x] = 2$

حد ندارد

۷) الف) $\lim\limits_{x\to 2} \frac{|x^3-8|}{x^2-4} \to x>2 \Rightarrow \frac{x^3-8}{x^2-4} \Rightarrow \frac{0}{0} \Rightarrow \frac{3x^2}{2x} \to \frac{3\times 4}{2\times 2} \to 3$

$\to x<2 \to \frac{8-x^3}{x^2-4} \Rightarrow \frac{-3x^2}{2x} \Rightarrow \frac{-3\times 4}{2\times 2} = -3$

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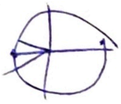
ب) $\lim\limits_{x\to\pi} \frac{|\sin x|}{2\sin x\cos x}$



$\to \pi^+ \Rightarrow \frac{-\sin x}{2\sin x\cos x} \to \frac{-1}{2\cos x} \Rightarrow \frac{-1}{2(-1)} = \frac{1}{2}$

$\to \pi^- \Rightarrow \frac{\sin x}{2\sin x\cos x} = \frac{1}{2\cos x} \to \frac{1}{2(-1)} = -\frac{1}{2}$

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۸) الف) $\lim\limits_{x\to\frac{3\pi}{2}} \sqrt{\cos x} \Rightarrow$

$\to \frac{3\pi}{2}^+ \Rightarrow \sqrt{0^+} = 0$

$\to \frac{3\pi}{2}^- \Rightarrow \sqrt{0^-} =$ ن

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۹) الف) $\lim_{x\to 0^+} \frac{(-1)^{[\sin x]}}{x^2(x-1)} \Longrightarrow$ $\sin x \to 0^+ \to [\sin x]=0 \Rightarrow (-1)^0 = \boxed{1}$

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

ب) $\lim_{x\to 2} \frac{x^2-[x^2]}{x-[x]}$

$\xrightarrow{2^+} = \frac{x^2-4}{x-2} \to \frac{0}{0} \to (x+2) \Rightarrow 2+2 = 4$

$\xrightarrow{2^-} \frac{x^2-3}{x-1} \Rightarrow \frac{8-3}{1} = 5$

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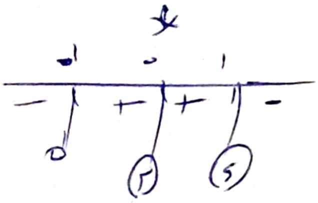
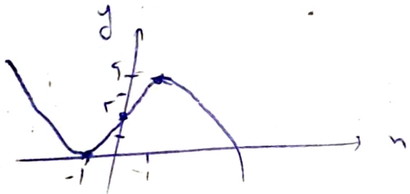
۱۰)

الف) $y = 5x^3 - 3x^5 + 2 \to -3x^5 + 5x^3 + 2 \to f'(x) = -15x^4 + 15x^2 \Rightarrow 15x^2(-x^2+1)$

$(15x^2)(1-x)(1+x)$





ب) $y = x^4 - 2x^2 + 3 \to y' = 4x^3 - 4x \to 4x(x-1)(x+1)$