غزل رضا

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①

$$\lim_{x\to ۲^+} \frac{۲x+۵}{x+۱} = \frac{۴+۵}{۲+۱} = \frac{۹}{۳} = ۳$$

$$\lim_{x\to ۲^-} \frac{۲x+۵}{x+۱} = \frac{۴+۵}{۲+۱} = \frac{۹}{۳} = ۳$$

$$\lim_{x\to ۲} \frac{۲x+۵}{x+۱} = \frac{۹}{۳} = ۳$$

$$\lim_{x\to ۰} \frac{۲x+۷}{[x^۲]} \quad \begin{cases} \xrightarrow{x\to ۰^+} \frac{۷}{۰} = \text{ت.ن} \\ \xrightarrow{x\to ۰^-} \frac{۷}{۰} = \text{ت.ن} \end{cases} \rightarrow \text{ت.ن}$$

②

$$\lim_{x\to ۳^-} ۴[x]-۲ = ۴\times ۲-۲ = ۸-۲ = ۶$$

$$\lim_{x\to ۳^-} [۴x-۲] = [۴\times ۳^- - ۲] = [۱۲^- - ۲] = [۱۰^-] = ۹$$

$$\left[\lim_{x\to ۳^-} ۴x-۲\right] = ۴\times ۳-۲ = ۱۰ \Rightarrow [۱۰] = ۱۰$$

$$\left[\lim_{x\to ۳^+} ۴x-۲\right] = ۳\times ۴-۲ = ۱۰ \Rightarrow [۱۰] = ۱۰$$

③

$$\lim_{x\to ۳^-} \frac{۳[x]+۱}{۲} = \frac{۳[۳^-]+۱}{۲} = \frac{۳\times ۲+۱}{۲} = \frac{۷}{۲}$$

$$\lim_{x\to ۳^-} \left[\frac{۳x+۱}{۲}\right] = \frac{۹^-+۱}{۲} = \frac{۱۰^-}{۲} \Rightarrow [۵^-] = ۴$$

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$$\left[\lim_{x\to 3^-} \frac{3x+1}{2}\right] = \frac{3\times 3+1}{2} = \frac{10}{2} = 5 \Rightarrow [5]=5$$

$$\left[\lim_{x\to 3^+} \frac{3x+1}{2}\right] = \frac{3\times 3+1}{2} = \frac{10}{2} = 5 \Rightarrow [5]=5$$

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(4)

$$\lim_{x\to 1} \frac{x-5}{x^2-6x+5} = \frac{x-5}{(x-1)(x-5)} = \frac{1}{x-1} \begin{cases} x\to 1^+ : & +\infty \\ x\to 1^- : & -\infty \end{cases}$$

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$$\lim_{x\to 3} \frac{x-4}{x^2-6x+9} \begin{cases} x\to 3^+ : & \frac{-1}{0^+} = -\infty \\ x\to 3^- : & \frac{-1}{0^+} = -\infty \end{cases}$$

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(5)

$$\lim_{x\to -3} [-3x]-[5x] = \begin{cases} x\to -3^+ : & 8-(-15) = 8+15 = 23 \\ x\to -3^- : & 9-(-16) = 9+16 = 25 \end{cases}$$

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

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(6)

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

$x\to 1^-$:

$$\left[\left(\frac{9}{10}\right)^3\left(4-\frac{27}{10}\right)\right]$$

$$\left[\frac{729}{1000}\times\frac{13}{10}\right] = 0$$

$$3+0=3$$

$x\to 1^+$:

$$\left[\left(\frac{11}{10}\right)^3\left(4-\frac{33}{10}\right)\right] = 0$$

$$\frac{1331}{1000}\times\frac{7}{10}$$

$$0+3=3$$

$$\lim_{x\to 1} [4x^3-3x^4+3] = \underline{3}$$

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$$\lim_{x\to 0}[4x^3-3x^4+3] = [4x^3-3x^4]+3 \Rightarrow [x^3(4-3x)]+3$$

$x\to 0^+$: $[\frac{1}{1000}\times(\frac{37}{10})]=0$, $0+3=3$

$x\to 0^-$: $[\frac{-1}{1000}\times\frac{43}{10}]=-1$, $3-1=2$

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7) $\lim_{x\to 2}\frac{|x^3-8|}{x^2-4}$

$x\to 2^+$: $\frac{x^3-8}{x^2-4}=\frac{(x-2)(x^2+4+2x)}{(x-2)(x+2)}= \lim_{x\to 2^+}\frac{x^2+2x+4}{x+2}=\frac{4+4+4}{4}=3$

$x\to 2^-$: $\frac{-x^3+8}{x^2-4}=\frac{-(x-2)(x^2+4+2x)}{(x-2)(x+2)}=\lim_{x\to 2^-}\frac{x^2+2x+4}{-x-2}$

$=\frac{4+4+4}{-4}=-3$

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$\lim_{x\to\pi}\frac{|\sin x|}{\sin 2x}$

$x\to\pi^+$: $\frac{-\sin x}{2\sin x\cos x}=\frac{-1}{2\cos x}=\frac{-1}{-2}=1/2$

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

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8) $\lim_{x\to \frac{3\pi}{2}}\sqrt{\cos x}$

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

$x\to \frac{3\pi}{2}^-$: $\sqrt{0^-}=$ ت.ن

$\lim_{x\to 0}\sqrt{x-2\sqrt{x}}$

$x\to 0^+$: $\sqrt{0-2\times 0}=0$

$x\to 0^-$: ت.ن به خاطر اینکه زیر رادیکال نمی‌تواند منفی باشد.

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$$\lim_{x\to 0^+} \frac{(-1)^{[\sin x]}}{x^3-x^2} = \frac{-1^0}{x^2(x-1)} = \frac{1}{x^3-x^2} = -\infty$$ ⑨

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

$x\to 2^+$: $\frac{x^2-4}{x-2} = \frac{(x-2)(x+2)}{x-2} = x+2 = 2+2 = \underline{\underline{4}}$

$x\to 2^-$: $\frac{x^2-3}{x-1} = \frac{4-3}{2-1} = \frac{1}{1} = \underline{\underline{1}}$

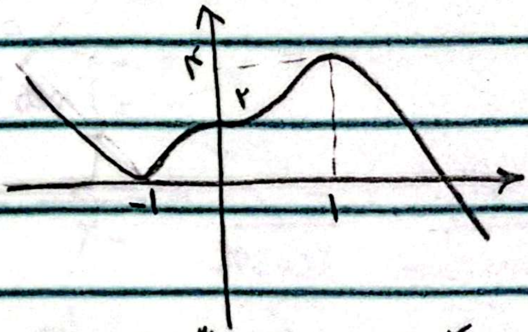
$y = 5x^3 - 3x^5 + 2 = -15x^4 + 15x^2 = 15x^2(-x^2+1)$ ⑩

$(1-x)(1+x)$

	-1		0^*		1	
$-$		$+$		$+$		$-$
$\searrow$		$\nearrow$		$\nearrow$		$\searrow$

$f(1)=4 \quad f(-1)=0$

$f(0)=2$



$y = x^4 - 2x^2 + 3 = 4x^3 - 4x \Rightarrow 4x(x^2-1) = 4x(x-1)(x+1)$

$0 \quad 1 \quad -1$

	-1		0		1	
$-$		$+$		$-$		$+$
$\searrow$		$\nearrow$		$\searrow$		$\nearrow$

$f(-1)=2 \quad f(0)=3$

$f(1)=2$