

نام و نام خانوادگی شماره کلاس پاسخنامه تشریحی تکلیف شماره کلاس

الف) $\lim_{x \rightarrow 1} \frac{x^2 + 1}{x} = \frac{1^2 + 1}{1} = 2$ ✓
ب) $\lim_{x \rightarrow 1} \frac{x^2 + 1}{x} = 2$ ✓

ج) $\lim_{x \rightarrow 1} \frac{x^2 + 1}{x} = 2$ ✓
د) $\lim_{x \rightarrow 0} \frac{x^2 + 1}{x} = \infty$ ✓
ن.ت. ✓
✓

الف) $\lim_{x \rightarrow 0^-} [x^2 - 1] = -1$ ✓
ب) $\lim_{x \rightarrow 0^-} [x^2 - 1] = -1$ ✓

ج) $\left[\lim_{x \rightarrow 0^-} x^2 \right] = 0$ ✓
د) $\left[\lim_{x \rightarrow 0^-} x^2 \right] = 0$ ✓
ن.ت. ✓

الف) $\lim_{x \rightarrow 0^-} \frac{x^2 + 1}{x} = \frac{0^2 + 1}{0^-} = -\infty$ ✓
ب) $\lim_{x \rightarrow 0^-} \left[\frac{x^2 + 1}{x} \right] = -\infty$ ✓

ج) $\left[\lim_{x \rightarrow 0^-} \frac{x^2 + 1}{x} \right] = -\infty$ ✓
د) $\left[\lim_{x \rightarrow 0^-} \frac{x^2 + 1}{x} \right] = -\infty$ ✓
ن.ت. ✓

الف) $\lim_{x \rightarrow 0^+} \frac{x - 1}{x^2 - 4x + 4} = \lim_{x \rightarrow 0^+} \frac{x - 1}{(x - 2)^2} = -\frac{1}{4}$ ✓
ب) $\lim_{x \rightarrow 0^+} \frac{x - 1}{x^2 - 4x + 4} = -\frac{1}{4}$ ✓
ن.ت. ✓

ج) $\lim_{x \rightarrow 0^+} \frac{x - 1}{x^2 - 4x + 4} = -\frac{1}{4}$ ✓
د) $\lim_{x \rightarrow 0^+} \frac{x - 1}{x^2 - 4x + 4} = -\frac{1}{4}$ ✓
ن.ت. ✓

الف) $\lim_{x \rightarrow -\infty} [-x^2] - [4x] = -\infty - (-\infty) = -\infty$ ✓
ب) $\lim_{x \rightarrow -\infty} [-x^2] - [4x] = -\infty - (-\infty) = -\infty$ ✓
ن.ت. ✓

ج) $\lim_{x \rightarrow -\infty} \left[\frac{-1}{x^2} \right] = 0$ ✓
د) $\lim_{x \rightarrow -\infty} \left[\frac{-1}{x^2} \right] = 0$ ✓
ن.ت. ✓

$\lim_{x \rightarrow 0} [f(x) - g(x)] = \lim_{x \rightarrow 0} [x^2 - (x^2 + x)] = \lim_{x \rightarrow 0} [-x] = 0$
 $\lim_{x \rightarrow 0^+} [f(x) - g(x)] = \lim_{x \rightarrow 0^+} [-x] = 0$
 $\lim_{x \rightarrow 0^-} [f(x) - g(x)] = \lim_{x \rightarrow 0^-} [-x] = 0$
 در نتیجه: $\lim_{x \rightarrow 0} [f(x) - g(x)] = 0$

الف) $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x^2 - x}$
 $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x^2 - x} = \lim_{x \rightarrow 1} \frac{(x-1)(x+1)}{x(x-1)} = \lim_{x \rightarrow 1} \frac{x+1}{x} = \frac{2}{1} = 2$
 ب) $\lim_{x \rightarrow 0} \frac{\sin x}{x}$
 $\lim_{x \rightarrow 0} \frac{\sin x}{x} = \lim_{x \rightarrow 0} \frac{\cos x}{1} = \frac{1}{1} = 1$

الف) $\lim_{x \rightarrow \frac{\pi}{2}} \cos x = 0$
 ب) $\lim_{x \rightarrow \frac{\pi}{2}} \sqrt{x} = \sqrt{\frac{\pi}{2}}$
 ج) $\lim_{x \rightarrow \frac{\pi}{2}} \frac{1}{\sqrt{x}} = \frac{1}{\sqrt{\frac{\pi}{2}}}$

الف) $\lim_{x \rightarrow 0} \frac{(-1)^{\lfloor \sin x \rfloor}}{x^2 - x^2} = \lim_{x \rightarrow 0} \frac{(-1)^{\lfloor \sin x \rfloor}}{0} = \frac{1}{0} = \infty$
 ب) $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1} = \lim_{x \rightarrow 1} \frac{(x-1)(x+1)}{x-1} = \lim_{x \rightarrow 1} (x+1) = 2$

الف) $y = \sin x$, $y' = \cos x$
 ب) $y = \cos x$, $y' = -\sin x$
 ج) $y = \tan x$, $y' = \sec^2 x$

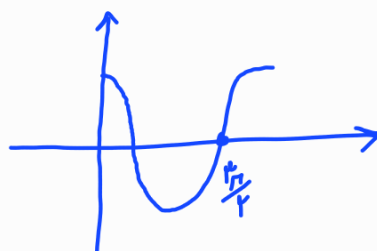
سوال ۵

$$\lim_{x \rightarrow -3} [-x^2] - [5x] = \begin{cases} \lim_{x \rightarrow (-3)^+} [-x^2] - [5x] = 1 - (-15) = 16 \\ \lim_{x \rightarrow (-3)^-} [-x^2] - [5x] = 9 - (-15) = 24 \end{cases}$$

$$\lim_{x \rightarrow (-\frac{1}{4})^-} \left[\frac{-1}{x^4} \right] = -19$$

$$x < -\frac{1}{4} \rightarrow x^4 > \frac{1}{16} \rightarrow -x^4 < -\frac{1}{16} \rightarrow -\frac{1}{x^4} > -16$$

$$\lim_{x \rightarrow \frac{\pi}{4}} \sqrt{\cos x} \rightarrow \begin{cases} \lim_{x \rightarrow \frac{\pi}{4}^+} \sqrt{\cos x} = \lim_{x \rightarrow \frac{\pi}{4}^+} \sqrt{0^+} = 0 \\ \lim_{x \rightarrow \frac{\pi}{4}^-} \sqrt{\cos x} = \lim_{x \rightarrow \frac{\pi}{4}^-} \sqrt{0^-} = \text{تعریف نشده} \end{cases}$$



سوال ۸

$$\lim_{x \rightarrow 0} \sqrt{x - 2\sqrt{x}} = \text{تعریف نشده} \quad x \geq 0 \quad (I)$$

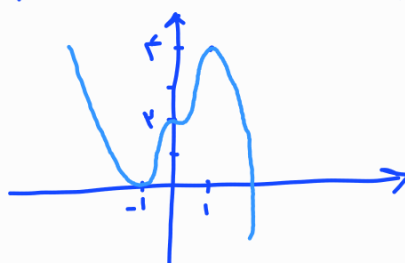
$$x - 2\sqrt{x} \geq 0 \rightarrow \sqrt{x}(\sqrt{x} - 2) \geq 0 \rightarrow \frac{0}{+|-|+} \rightarrow x \geq 4 \leq x \leq 0 \quad (II)$$

پسند : $x \geq 4 \leq x \leq 0 \rightarrow (I) \cap (II) \rightarrow x \geq 4 \leq x = 0$.

$$y = 5x^3 - 3x^2 + 1 \quad \begin{cases} x = 0 \\ x = 1 \\ x = -1 \end{cases}$$

$$y' = 15x^2 - 6x \xrightarrow{y'=0} 15x^2(1-x) = 0 \rightarrow 15x^2(1-x)(1+x) = 0 \rightarrow$$

x	$-\infty$	-1	0	1	$+\infty$
y'	-	+	+	-	-
y	$\searrow$	$\nearrow$	$\nearrow$	$\searrow$	$\searrow$



سوال ۱۰

$$y = x^4 - 2x^3 + 3$$

$$y' = 4x^3 - 6x^2 \xrightarrow{y'=0} 2x(x^2 - 3) = 0 \rightarrow 2x(x-1)(x+1) = 0 \rightarrow \begin{cases} x = 0 \\ x = 1 \\ x = -1 \end{cases}$$

x	$-\infty$	-1	0	1	$+\infty$
y'	-	+	-	+	+
y	$\searrow$	$\nearrow$	$\searrow$	$\nearrow$	$\nearrow$

