

نام و نام خانوادگی پاسخنامه تشریحی تکلیف شماره ۱۸۰ ... کلاس ...

الف) $\lim_{x \rightarrow 2^+} \frac{2x+1}{x+1} = \frac{2(2)+1}{2+1} = \frac{5}{3} = \boxed{\frac{5}{3}}$ ✓

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

ج) $\lim_{x \rightarrow 2} \frac{2x+1}{x+1} = \frac{2(2)+1}{2+1} = \frac{5}{3} = \boxed{\frac{5}{3}}$ ✓

د) $\lim_{x \rightarrow 0} \frac{x+1}{x^2} \rightarrow \frac{1}{0^+} = +\infty$
 $\frac{1}{0^-} = -\infty$ حد ندارد! ✓

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الف) $\lim_{x \rightarrow 3^-} f(x) - 2 = f(3^-) - 2 = 4 - 2 = \boxed{2}$ ✓

ب) $\lim_{x \rightarrow 3^-} [5x - 2] = [15 - 2] = [13] = \boxed{13}$ ✓

ج) $\lim_{x \rightarrow 3^-} [5x - 2] = [15 - 2] = [13] = \boxed{13}$ ✓

د) $\lim_{x \rightarrow 3^+} [5x - 2] = [15 - 2] = [13] = \boxed{13}$ ✓

$\lim_{x \rightarrow 3^-} 5x - 2 = 15 - 2 = 13$

$\lim_{x \rightarrow 3^+} 5x - 2 = 15 - 2 = 13$

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الف) $\lim_{x \rightarrow 3^-} \frac{f(x)+1}{2} = \frac{f(3^-)+1}{2} = \frac{4+1}{2} = \boxed{\frac{5}{2}}$ ✓

ب) $\lim_{x \rightarrow 3^-} \left[\frac{f(x)+1}{2} \right] = \left[\frac{f(3^-)+1}{2} \right] = \left[\frac{4+1}{2} \right] = \left[\frac{5}{2} \right] = \boxed{\frac{5}{2}}$ ✓

ج) $\lim_{x \rightarrow 3^-} \frac{f(x)+1}{2} = \left[\frac{5}{2} \right] = \boxed{\frac{5}{2}}$ ✓

د) $\lim_{x \rightarrow 3^+} \frac{f(x)+1}{2} = \left[\frac{5}{2} \right] = \boxed{\frac{5}{2}}$ ✓

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

$\lim_{x \rightarrow 3^+} \frac{f(x)+1}{2} = \frac{f(3^+)+1}{2} = \frac{5}{2}$

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الف) $\lim_{x \rightarrow 1} \frac{x-1}{x^2-4x+4} = \frac{1-1}{1-4+4} = \frac{0}{0}$

ب) $\lim_{x \rightarrow 2} \frac{x-2}{x^2-4x+4} = \frac{2-2}{(2-2)^2} = \frac{0}{0}$

$\hookrightarrow x^2-4x+4 = (x-1)(x-1) \Rightarrow \frac{1}{x-1} = \frac{1}{x-1}$

$\hookrightarrow (x-2)^2 = \frac{1}{x-2}$

$\lim_{x \rightarrow 1^+} \frac{1-1}{0^+} = \frac{0}{0^+} = +\infty$
 $\lim_{x \rightarrow 1^-} \frac{1-1}{0^-} = \frac{0}{0^-} = -\infty$ حد ندارد! ✓

$\lim_{x \rightarrow 2^+} \frac{x-2}{0^+} = \frac{0}{0^+} = +\infty$
 $\lim_{x \rightarrow 2^-} \frac{x-2}{0^-} = \frac{0}{0^-} = -\infty$ حد ندارد! ✓

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الف) $\lim_{x \rightarrow -2} [-3x] - [4x]$

ب) $\lim_{x \rightarrow (-\frac{1}{2})^-} \left[\frac{-1}{x^2} \right]$

$\lim_{x \rightarrow -2^+} [-3(-2^+)] - [4(-2^+)] = [6^-] - [-8^+] = 6 - (-8) = 14$ ✓

$x < -\frac{1}{2} \Rightarrow \frac{1}{x} > -2 \Rightarrow \frac{1}{x^2} < 4$

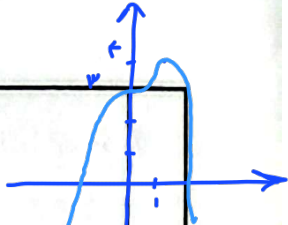
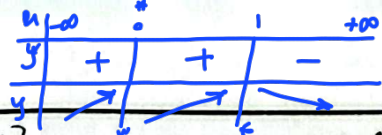
$\lim_{x \rightarrow -2^-} [-3(-2^-)] - [4(-2^-)] = [6^+] - [-8^-] = 6 - (-8) = 14$ ✓

$\frac{-1}{x^2} > -4 \Rightarrow \lim_{x \rightarrow (-\frac{1}{2})^-} \left[\frac{-1}{x^2} \right] = [-4^+] = \boxed{-4}$ ✓

حد ندارد

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ا) $\lim_{x \rightarrow 1} [x^2 - 2x^2 + 1]$

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

$x=1 \Rightarrow 1 - 2(1) + 1 = 0$
 $\Rightarrow [x^-] = 1$

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

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

$x=0 \Rightarrow 0 - 2(0) + 1 = 1$
 $\Rightarrow [x^+] = 1$ (1,0)

ا) $\lim_{x \rightarrow 2} \frac{|x^2 - 1|}{x^2 - 1} = \frac{|1 - 1|}{1 - 1} = \frac{0}{0}$

$x > 2 \Rightarrow \frac{x^2 - 1}{x^2 - 1} = \frac{(x-1)(x+1)}{(x-1)(x+1)} = \frac{x+1}{x+1}$
 $x=2 \Rightarrow \frac{2+1}{2+1} = 1$

$x < 2 \Rightarrow \frac{-(x^2 - 1)}{x^2 - 1} = \frac{-(x-1)(x+1)}{(x-1)(x+1)} = \frac{-(x+1)}{x+1}$
 $x=2 \Rightarrow \frac{-(2+1)}{2+1} = -1$

ب) $\lim_{x \rightarrow 1} \frac{|\sin x|}{\sin x} = \frac{|0|}{0}$

$x > 1 \Rightarrow \sin x < 0 \Rightarrow \frac{\sin x}{\sin x \cos x} = \frac{1}{\cos x} = \frac{1}{\cos(1)}$

$x < 1 \Rightarrow \sin x > 0 \Rightarrow \frac{\sin x}{\sin x \cos x} = \frac{1}{\cos x} = \frac{1}{\cos(1)}$

ا) $\lim_{x \rightarrow \frac{\pi}{2}} \sqrt{\cos x} = \sqrt{0}$

$x > \frac{\pi}{2} \Rightarrow \cos x < 0 \Rightarrow \sqrt{0^+} = 0$

$x < \frac{\pi}{2} \Rightarrow \cos x > 0 \Rightarrow \sqrt{0^-} = 0$

ب) $\lim_{x \rightarrow 0} \sqrt{x - x\sqrt{x}} = \sqrt{0 - 0} = 0$

$x > 0 \Rightarrow \sqrt{x - x\sqrt{x}} = \sqrt{x(1 - \sqrt{x})} = \sqrt{x}(\sqrt{1 - \sqrt{x}})$
 $\sqrt{x} \rightarrow 0, \sqrt{1 - \sqrt{x}} \rightarrow 1 \Rightarrow 0 \cdot 1 = 0$

ا) $\lim_{x \rightarrow 0^+} \frac{(-1)^{\sin x}}{x^2 - x^2}$

$x > 0 \Rightarrow \sin x > 0 \Rightarrow (-1)^{\sin x} = 1$
 $x^2 - x^2 = x^2(x-1)$

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

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

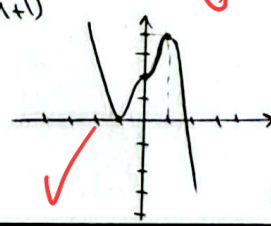
$x > 2 \Rightarrow \frac{x^2 - [x^2]}{x - [x]} = \frac{x^2 - (x-1)^2}{x - (x-1)} = \frac{x^2 - (x^2 - 2x + 1)}{1} = 2x - 1$

$x < 2 \Rightarrow \frac{x^2 - [x^2]}{x - [x]} = \frac{x^2 - (x-1)^2}{x - (x-1)} = \frac{x^2 - (x^2 - 2x + 1)}{1} = 2x - 1$

ا) $y = 2x^2 - 2x^2 + 1$

$y = -2x^2 + 2x^2 + 1$
 $y' = -4x + 4x = 0$

$x=1 \Rightarrow y = -2(1) + 2(1) + 1 = 1$
 $x=0 \Rightarrow y = 0 + 0 + 1 = 1$



ب) $y = x^2 - 2x^2 + 1$

$y' = 2x - 4x = -2x$

$x=1 \Rightarrow y = 1 - 2(1) + 1 = 0$
 $x=0 \Rightarrow y = 0 - 2(0) + 1 = 1$
 $x=-1 \Rightarrow y = 1 - 2(1) + 1 = 0$

