

الف)  $\lim_{x \rightarrow 2^+} \frac{2x+8}{x+1} = \frac{9}{3} = 3$  ✓

ج)  $\lim_{x \rightarrow 2} \frac{2x+8}{x+1} = \frac{9}{3} = 3$  ✓

(۱/۵)

ب)  $\lim_{x \rightarrow 2^-} \frac{2x+8}{x+1} = \frac{9}{3} = 3$  ✓

د)  $\lim_{x \rightarrow 0} \frac{2x+7}{[x^2]} = +\infty$

۱)  $\lim_{x \rightarrow 0} \frac{2x+7}{[x^2]} = \lim_{x \rightarrow 0} \frac{2(0)+7}{[0]} = \frac{7}{0}$  تعریف نشده  
خرج صفر دقت می شود ←

$x \rightarrow 0^+ = \frac{7}{0^+} = +\infty$   
 $x \rightarrow 0^- = \frac{7}{0^-} = +\infty$

ان)  $\lim_{x \rightarrow 3^-} 2[x] - 2 = 2[3^-] - 2 = 4$  ✓

ج)  $\left[ \lim_{x \rightarrow 3^-} 2x - 2 \right] = [10] = 10$  ✓

ب)  $\lim_{x \rightarrow 3^-} [2x - 2] = [10^-] = 9$  ✓

د)  $\left[ \lim_{x \rightarrow 3^+} 2x - 2 \right] = [10] = 10$  ✓

(۲)

ان)  $\lim_{x \rightarrow 2^-} \frac{3[x]+1}{2} = \frac{3[2^-]+1}{2} = \frac{7}{2}$  ✓

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

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

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

(۲)

ان)  $\lim_{x \rightarrow 1} \frac{x-8}{x^2-4x+8}$

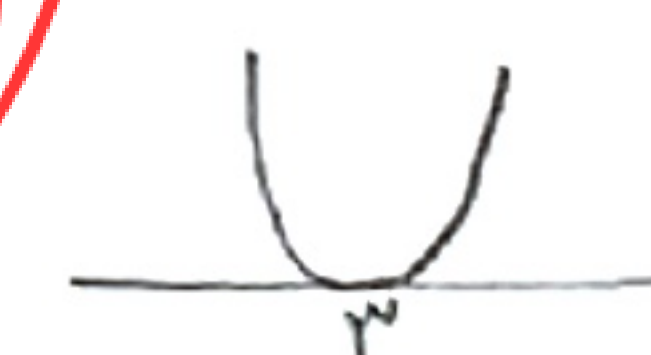
$x \rightarrow 1^+ = \frac{-7}{-3} = +\infty$  ✓  
 $x \rightarrow 1^- = \frac{-7}{-5} = -\infty$



صاف دارد.

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

$x \rightarrow 2^+ = \frac{-4}{5} = -\infty$  ✓  
 $x \rightarrow 2^- = \frac{-4}{5} = -\infty$



صاف دارد.

ان)  $\lim_{x \rightarrow -3} [-3x] - [8x]$

$x \rightarrow -3^+ [9^-] - [-18^+] = 1 + 18 = 19$  ✓  
 $x \rightarrow -3^- [9^+] - [-18^-] = 9 + 18 = 27$

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

$x < -\frac{1}{2} \rightarrow \left[ \frac{1}{x^2} \right] = [-16^+] = -16$  ✓  
 $x > -\frac{1}{2} \rightarrow \left[ \frac{1}{x^2} \right] = [-16^-] = -16$

صاف دارد.

(۲)

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <p>ا) <math>\lim_{x \rightarrow 1} [3x^3 - 3x^2 + 3]</math></p> <p><math>f(x) = 3x^3 - 3x^2 + 3 \rightarrow f'(x) = 9x^2 - 6x &lt; 0</math></p>           | <p><math>x \rightarrow 1^+ = [3] = 3</math></p> <p><math>x \rightarrow 1^- = [3] = 3</math></p> <p><math>x \rightarrow 0^+ [x^+] = 0</math></p> <p><math>x \rightarrow 0^- [x^-] = 0</math></p> <p>Graph of <math>f(x) = 3x^3 - 3x^2 + 3</math> showing a local maximum at <math>x=1</math>.</p>                                                                                                                                                                                                                                                      | 6  |
| <p>ب) <math>\lim_{x \rightarrow 0} [3x^3 - 3x^2 + 3]</math></p> <p><math>f'(x) = 0</math></p>                                                             | <p><math>x \rightarrow 0^+ [x^+] = 0</math></p> <p><math>x \rightarrow 0^- [x^-] = 0</math></p> <p><math>x \rightarrow \pi^+ [x^+] = \pi</math></p> <p><math>x \rightarrow \pi^- [x^-] = \pi</math></p> <p>Graph of <math>f(x) = 3x^3 - 3x^2 + 3</math> showing a local maximum at <math>x=1</math>.</p>                                                                                                                                                                                                                                              | 7  |
| <p>ا) <math>\lim_{x \rightarrow 2} \frac{ x^3 - 1 }{x^2 - 2}</math></p> <p>ب) <math>\lim_{x \rightarrow \pi} \frac{ \sin x }{\sin x}</math></p>           | <p><math>x \rightarrow 2^+ [x^+] = \frac{2^3 - 1}{2^2 - 2} = \frac{7}{2} = 3.5</math></p> <p><math>x \rightarrow 2^- [x^-] = \frac{2^3 - 1}{2^2 - 2} = \frac{7}{2} = 3.5</math></p> <p><math>x \rightarrow \pi^+ [x^+] = \frac{ \sin \pi }{\sin \pi} = \frac{0}{0} = \frac{1}{1} = 1</math></p> <p><math>x \rightarrow \pi^- [x^-] = \frac{ \sin \pi }{\sin \pi} = \frac{0}{0} = \frac{1}{1} = 1</math></p> <p>Graph of <math>f(x) = \frac{ x^3 - 1 }{x^2 - 2}</math> showing a jump discontinuity at <math>x=2</math>.</p>                           | 8  |
| <p>ا) <math>\lim_{x \rightarrow \frac{\pi}{2}} \sqrt{\cos x}</math></p> <p>ب) <math>\lim_{x \rightarrow 0} \sqrt{x - 2\sqrt{x}}</math></p>                | <p><math>x \rightarrow \frac{\pi}{2}^+ [x^+] = \sqrt{\cos \frac{\pi}{2}} = \sqrt{0} = 0</math></p> <p><math>x \rightarrow \frac{\pi}{2}^- [x^-] = \sqrt{\cos \frac{\pi}{2}} = \sqrt{0} = 0</math></p> <p><math>x \rightarrow 0^+ [x^+] = \sqrt{0} = 0</math></p> <p><math>x \rightarrow 0^- [x^-] = \sqrt{0} = 0</math></p> <p>Graph of <math>f(x) = \sqrt{\cos x}</math> showing a jump discontinuity at <math>x=\frac{\pi}{2}</math>.</p>                                                                                                           | 9  |
| <p>ا) <math>\lim_{x \rightarrow 0^+} \frac{f(x) [\sin x]}{x^3 - x^2}</math></p> <p>ب) <math>\lim_{x \rightarrow 0} \frac{x^3 - [x^3]}{x - [x]}</math></p> | <p><math>x \rightarrow 0^+ [x^+] = \frac{f(x) [\sin x]}{x^3 - x^2} = \frac{1}{0} = -\infty</math></p> <p><math>x \rightarrow 0^- [x^-] = \frac{f(x) [\sin x]}{x^3 - x^2} = \frac{1}{0} = -\infty</math></p> <p><math>x \rightarrow 0^+ [x^+] = \frac{x^3 - [x^3]}{x - [x]} = \frac{0}{0} = \frac{1}{1} = 1</math></p> <p><math>x \rightarrow 0^- [x^-] = \frac{x^3 - [x^3]}{x - [x]} = \frac{0}{0} = \frac{1}{1} = 1</math></p> <p>Graph of <math>f(x) = \frac{f(x) [\sin x]}{x^3 - x^2}</math> showing a jump discontinuity at <math>x=0</math>.</p> | 10 |