

موضوع: حد و پیوستگی (استثنا)

$$\lim_{x \rightarrow 2^+} \frac{x^2 + 5}{x+1} = \frac{2^2 + 5}{2+1} = \frac{9}{3} = 3 \quad \checkmark$$

$$\lim_{x \rightarrow 2^-} \frac{x^2 + 5}{x+1} = \frac{2^2 + 5}{2+1} = \frac{9}{3} = 3 \quad \checkmark$$

$$\lim_{x \rightarrow 2} \frac{x^2 + 5}{x+1} = \frac{2^2 + 5}{2+1} = \frac{9}{3} = 3 \quad \checkmark$$

$$\lim_{x \rightarrow 0} \frac{x^2 + 7}{x} = \frac{0^2 + 7}{0} \rightarrow \text{تعریف نشده} \quad \checkmark$$

$$\lim_{x \rightarrow 3^-} f(x) - 2 = f(3^-) - 2 = 6 \quad \checkmark$$

$$\lim_{x \rightarrow 3} [x-2] = [10^-] = 9 \quad \checkmark$$

$$\lim_{x \rightarrow 3^-} [x-2] = [4^-] = 3 \quad \checkmark$$

$$\lim_{x \rightarrow 3^+} [x-2] = [4^+] = 4 \quad \checkmark$$

$$\lim_{x \rightarrow 2^-} \frac{x^2 + 1}{x} = \frac{2^2 + 1}{2} = \frac{5}{2} \quad \checkmark$$

$$\lim_{x \rightarrow 3^-} \left[\frac{x^2 + 1}{x} \right] = \left[\frac{3^2 + 1}{3} \right] = [10^-] = 3 \quad \checkmark$$

$$\lim_{x \rightarrow 2^-} \frac{x^2 + 1}{x} = \frac{2^2 + 1}{2} = \frac{5}{2} \quad \checkmark$$

$$\lim_{x \rightarrow 2^+} \frac{x^2 + 1}{x} = \frac{2^2 + 1}{2} = \frac{5}{2} \quad \checkmark$$

$$\lim_{x \rightarrow 1} \frac{x-5}{x^2-9x+20} \begin{matrix} \xrightarrow{x \rightarrow 1^+} \frac{0^-}{0^+} = +\infty \\ \xrightarrow{x \rightarrow 1^-} \frac{0^+}{0^-} = -\infty \end{matrix} \quad \checkmark$$

$$\lim_{x \rightarrow 3} \frac{x-4}{x^2-9x+20} \begin{matrix} \xrightarrow{x \rightarrow 3^+} \frac{-1}{0^+} = -\infty \\ \xrightarrow{x \rightarrow 3^-} \frac{-1}{0^-} = +\infty \end{matrix} \quad \checkmark$$

$$\lim_{x \rightarrow -2} [-3x] - [5x] \begin{matrix} \xrightarrow{x \rightarrow (-2)^+} [6^-] - [-10^+] = 1 - (-10) = 11 \\ \xrightarrow{x \rightarrow (-2)^-} [6^+] - [-10^-] = 6 - (-10) = 16 \end{matrix} \quad \checkmark$$

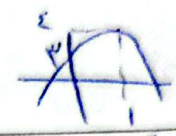
$$\lim_{x \rightarrow (-\frac{1}{2})^-} \left[-\frac{1}{x^2} \right] = [-16^+] = -16 \quad \checkmark$$

شکل تابع را در ذهن تجسم کن

$$\text{الف) } \lim_{x \rightarrow 1} [x^3 - 2x^2 + 3] = [1] = 2 \quad \checkmark$$

$$\text{ب) } \lim_{x \rightarrow 1} [x^3 - 2x^2 + 3] = 1^3 - 2 \cdot 1^2 + 3 = 1 - 2 + 3 = 2 \quad \checkmark$$


$$\text{ج) } \lim_{x \rightarrow 0} [x^3 - 2x^2 + 3] = 0^3 - 2 \cdot 0^2 + 3 = 3 \quad \checkmark$$

$$\text{د) } \lim_{x \rightarrow 0} [x^3 - 2x^2 + 3] = 0^3 - 2 \cdot 0^2 + 3 = 3 \quad \checkmark$$


$$\text{الف) } \lim_{x \rightarrow 2} \frac{x^2 - 1}{x^2 - 4} = \frac{2^2 - 1}{2^2 - 4} = \frac{3}{0} = \infty \quad \checkmark$$

$$\text{ب) } \lim_{x \rightarrow 2} \frac{\sin x}{\cos x} = \frac{\sin 2}{\cos 2} = \frac{0.909}{-0.416} = -2.18 \quad \checkmark$$

$$\text{الف) } \lim_{x \rightarrow \frac{\pi}{2}} \sqrt{\cos x} = \sqrt{\cos \frac{\pi}{2}} = \sqrt{0} = 0 \quad \checkmark$$

$$\text{ب) } \lim_{x \rightarrow 0} \sqrt{x - 2\sqrt{x}} = \sqrt{0 - 2\sqrt{0}} = \sqrt{0} = 0 \quad \checkmark$$

$$\text{الف) } \lim_{x \rightarrow 1} \frac{(-1)^x}{x^2 - 1} = \frac{(-1)^1}{1^2 - 1} = \frac{-1}{0} = \infty \quad \checkmark$$

$$\text{ب) } \lim_{x \rightarrow 1} \frac{x^2 - [x]}{x - [x]} = \frac{1^2 - 1}{1 - 1} = \frac{0}{0} = \text{indeterminate} \quad \checkmark$$

$$\text{الف) } f(x) = x^3 - 2x^2 + 3 \rightarrow f'(x) = 3x^2 - 4x = x(3x - 4) = 0 \rightarrow x = 0 \text{ or } x = \frac{4}{3}$$

$$\text{ب) } f(x) = x^3 - 2x^2 + 3 \rightarrow f''(x) = 6x - 4 = 0 \rightarrow x = \frac{2}{3}$$
