

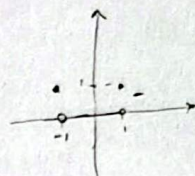
۱ الف) $\lim_{n \rightarrow 2^+} \frac{2n+5}{n+1} = \lim_{n \rightarrow 2^+} \frac{2(2)+5}{(2)+1} = \frac{9}{3} = 3$

ب) $\lim_{n \rightarrow 2^-} \frac{2n+5}{n+1} = 3$

ج) $\lim_{n \rightarrow 2} \frac{2n+5}{n+1} = 3$

د) $\lim_{n \rightarrow 0} \frac{2n+5}{[n^2]} = \lim_{n \rightarrow 0} \frac{2n+5}{0} = \text{تعریف نشده}$

$\lim_{n \rightarrow 0} [x^n] = 0$



۲ الف) $\lim_{n \rightarrow 3^-} f(n) - 2 = \lim_{n \rightarrow 3^-} f(3) - 2 = 6$

ب) $\lim_{n \rightarrow 3^-} [f(n) - 2] = \lim_{n \rightarrow 3^-} [f(n)] - 2 = \lim_{n \rightarrow 3^-} [12] - 2 = 10$

ج) $\left[\lim_{n \rightarrow 3^-} f(n) - 2 \right] = \left[\lim_{n \rightarrow 3^-} f(3) - 2 \right] = [10] = 10$ د) $\left[\lim_{n \rightarrow 3^+} f(n) - 2 \right] = \left[\lim_{n \rightarrow 3^+} f(3) - 2 \right] = [10] = 10$

۳ الف) $\lim_{n \rightarrow 2^-} \frac{2[n]+1}{2} = \lim_{n \rightarrow 2^-} \frac{2(2)+1}{2} = \frac{5}{2}$

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

ج) $\left[\lim_{n \rightarrow 2^-} \frac{2n+1}{2} \right] = \left[\lim_{n \rightarrow 2^-} \frac{2(2)+1}{2} \right] = [5] = 5$ د) $\left[\lim_{n \rightarrow 2^+} \frac{2n+1}{2} \right] = [5] = 5$

۴ الف) $\lim_{n \rightarrow 1} \frac{n-5}{n^2-n+5} = \lim_{n \rightarrow 1} \frac{n-5}{(n-5)(n+1)} = \lim_{n \rightarrow 1} \frac{1}{n+1} = \frac{1}{2}$

در نقطه $n=1$ در دندرم

ب) $\lim_{n \rightarrow 3} \frac{n-2}{n^2-n+9} = \lim_{n \rightarrow 3} \frac{n-2}{(n-3)^2} = \lim_{n \rightarrow 3} \frac{-1}{(n-3)^2} = -\infty$

۵ الف) $\lim_{n \rightarrow 2^-} [-f(n)] - [5n] = \lim_{n \rightarrow 2^-} [-f(2)] - [5(2)] = \lim_{n \rightarrow 2^-} [9] - [10] = 9 - 10 = -1$

ب) $\lim_{n \rightarrow 2^-} [-f(n)] - [5n] = \lim_{n \rightarrow 2^-} [9] - [10] = 9 - 10 = -1$

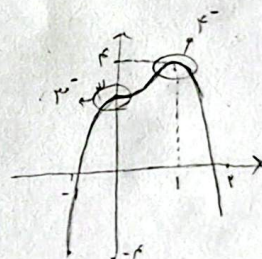
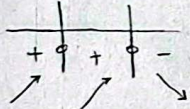
در $n=2$ در دندرم

ب) $\lim_{n \rightarrow \frac{1}{2}} \left[\frac{-1}{n^2} \right] = \lim_{n \rightarrow \frac{1}{2}} [-4] = -4$

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

۶ الف) $\lim_{n \rightarrow 1} \frac{f(n^2 - 2n^2 + 3)}{f(n)} = \lim_{n \rightarrow 1} [f] = 3$

$f'(n) = 12n^2 - 12n^2 = 12n^2(1-n)$



ب) $\lim_{n \rightarrow 0} [f(n^2 - 2n^2 + 3)] = \lim_{n \rightarrow 0} [3] = 3$

۷ الف) $\lim_{n \rightarrow 2} \frac{|n^2-1|}{n^2-4} = \lim_{n \rightarrow 2^+} \frac{|n^2-1|}{n^2-4} = \lim_{n \rightarrow 2^+} \frac{n^2-1}{n^2-4} = \lim_{n \rightarrow 2^+} \frac{(n-1)(n+1)}{(n-2)(n+2)} = \frac{1}{2}$

$\lim_{n \rightarrow 2^-} \frac{|n^2-1|}{n^2-4} = \lim_{n \rightarrow 2^-} \frac{-(n^2-1)}{n^2-4} = -\frac{1}{2}$

در $n=2$ در دندرم

ب) $\lim_{n \rightarrow \pi} \frac{|\sin n|}{\sin n} = \lim_{n \rightarrow \pi} \frac{-\sin n}{\sin n} = \lim_{n \rightarrow \pi} \frac{-1}{1} = -1$

در $n=\pi$ در دندرم

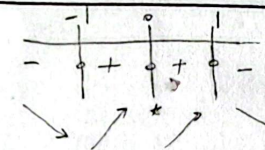
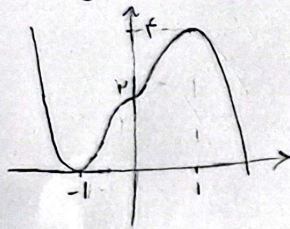
$\lim_{n \rightarrow \pi} \frac{|\sin n|}{\sin n} = \lim_{n \rightarrow \pi} \frac{\sin n}{\sin n} = \frac{1}{1} = 1$

الف) $\lim_{n \rightarrow \frac{\pi}{2}} \sqrt{\cos n} \rightarrow \lim_{n \rightarrow \frac{\pi}{2}} \sqrt{\cos n} = 0$
 $\cos n = 0 \Rightarrow n = \frac{\pi}{2}$
 $\lim_{n \rightarrow \frac{\pi}{2}} \sqrt{\cos n} = 0$ تعریف شده
 $\cos n = 0 \Rightarrow n = \frac{\pi}{2}$

ب) $\lim_{n \rightarrow 0} \sqrt{n-2\sqrt{n}} = \lim_{n \rightarrow 0} \sqrt{(\sqrt{n}-1)^2 - 1}$
 $\lim_{n \rightarrow 0^+} \sqrt{(\sqrt{n}-1)^2 - 1} = 0$
 $\lim_{n \rightarrow 0^+} \sqrt{(\sqrt{n}-1)^2 - 1} = 0$ تعریف شده
 $\lim_{n \rightarrow 0^+} \sqrt{(\sqrt{n}-1)^2 - 1} = 0$ تعریف شده

الف) $\lim_{n \rightarrow 0^+} \frac{(-1)^{[\sin n]}}{n^2 - n^2} = \lim_{n \rightarrow 0^+} \frac{(-1)^{[0^+]}}{n^2 - n^2} = \lim_{n \rightarrow 0^+} \frac{1}{n^2 - n^2} = -\infty$
 $n^2 - n^2 = n^2(n-1)$
 $\lim_{n \rightarrow 0^+} \frac{n^2 - [n^2]}{n - [n]} = \lim_{n \rightarrow 0^+} \frac{n^2 - [n^2]}{n - [n]} = \lim_{n \rightarrow 0^+} \frac{n^2 - f}{n - f} = \lim_{n \rightarrow 0^+} \frac{n^2 - f}{n - f} = f$
 $\lim_{n \rightarrow 0^+} \frac{n^2 - [n^2]}{n - [n]} = \lim_{n \rightarrow 0^+} \frac{n^2 - f}{n - f} = f$

الف) $y = \omega n^2 - 2n^2 + 2 = f(n)$ $f'(n) = 2\omega n - 4n = 2n(\omega - 2)$



ب) $y = n^2 - 2n^2 + 2 = g(n)$ $g'(n) = 2n - 4n = -2n$

