



Universidad Tecnológica del Perú

Cálculo I

Taller 2

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Sección 32384

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Ejercicio 1

Determine el valor de los siguientes límites:

$\lim_{x \rightarrow \infty} \frac{6x^2 + 5x^3 - 4}{2x^3 - 3 - x^2}$ $\lim_{x \rightarrow \infty} \frac{\frac{6x^2}{x^3} + \frac{5x^3}{x^3} - \frac{4}{x^3}}{\frac{2x^3}{x^3} - \frac{3}{x^3} - \frac{x^2}{x^3}}$ $\lim_{x \rightarrow \infty} \frac{\frac{6}{x} + 5 - \frac{4}{x^3}}{2 - \frac{3}{x^3} - \frac{1}{x}}$ $\frac{0 + 5 - 0}{2 - 0 - 0} = \frac{5}{2}$	$\lim_{x \rightarrow \infty} \frac{\sqrt{9x^4 - 1} + 5x^2}{\sqrt{x^4 - 2} + x}$ $\lim_{x \rightarrow \infty} \frac{\sqrt{\frac{9x^4}{x^4} - \frac{1}{x^4}} + \frac{5x^2}{x^2}}{\sqrt{\frac{x^4}{x^4} - \frac{2}{x^4}} + \frac{x}{x^2}}$ $\lim_{x \rightarrow \infty} \frac{\sqrt{9 - \frac{1}{x^4}} + 5}{\sqrt{1 - \frac{2}{x^4}} + \frac{1}{x}}$ $\frac{\sqrt{9 - 0} + 5}{\sqrt{1 - 0} + 0} = \frac{3 + 5}{1 + 0} = 8$	$\lim_{x \rightarrow \infty} \frac{\sqrt{81x^6 + 8} - 5x^3}{\sqrt{4x^6 - x} + 1}$ $\lim_{x \rightarrow \infty} \frac{\sqrt{\frac{81x^6}{x^6} + \frac{8}{x^6}} - \frac{5x^3}{x^3}}{\sqrt{\frac{4x^6}{x^6} - \frac{x}{x^6}} + \frac{1}{x^3}}$ $\lim_{x \rightarrow \infty} \frac{\sqrt{81 + 0} - 5}{\sqrt{4 - 0} + 0}$ $\frac{9 - 5}{2 + 0} = \frac{4}{2} = 2$
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Ejercicio 2

Determine el valor de los siguientes límites:

$\lim_{x \rightarrow 4} \frac{\sqrt{2x+1} - 3}{2x^2 - x - 28} = \frac{0}{0}$ $\lim_{x \rightarrow 4} \frac{\sqrt{2x+1} - 3}{2x^2 - x - 28} \cdot \frac{\sqrt{2x+1} + 3}{\sqrt{2x+1} + 3}$ $\lim_{x \rightarrow 4} \frac{2x - 8}{(x - 4)(2x + 7)(\sqrt{2x+1} + 3)}$ $\lim_{x \rightarrow 4} \frac{2}{(2(4) + 7)(\sqrt{2(4) + 1} + 3)} = \frac{1}{45}$	<table style="margin: auto; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 5px 10px;">2</td> <td style="border-right: 1px solid black; padding: 5px 10px;">-1</td> <td style="padding: 5px 10px;">-28</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px 10px;">4</td> <td style="border-right: 1px solid black; padding: 5px 10px;">8</td> <td style="padding: 5px 10px;">28</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px 10px;">2</td> <td style="border-right: 1px solid black; padding: 5px 10px;">7</td> <td style="padding: 5px 10px;">0</td> </tr> </table>	2	-1	-28	4	8	28	2	7	0												
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4	8	28																				
2	7	0																				
$\lim_{x \rightarrow -1} \frac{2x^3 - 7x^2 - 5x + 4}{x^2 + 6x + 5} = \frac{0}{0}$ $\lim_{x \rightarrow -1} \frac{(x+1)(2x^2 - 9x + 4)}{(x+1)(x+5)}$ $\lim_{x \rightarrow -1} \frac{2x^2 - 9x + 4}{x + 5}$ $\lim_{x \rightarrow -1} \frac{2(-1)^2 - 9(-1) + 4}{-1 + 5} = \frac{15}{4}$	<table style="margin: auto; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 5px 10px;">2</td> <td style="border-right: 1px solid black; padding: 5px 10px;">-7</td> <td style="border-right: 1px solid black; padding: 5px 10px;">-5</td> <td style="padding: 5px 10px;">4</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px 10px;">-1</td> <td style="border-right: 1px solid black; padding: 5px 10px;">-2</td> <td style="border-right: 1px solid black; padding: 5px 10px;">9</td> <td style="padding: 5px 10px;">-4</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px 10px;">2</td> <td style="border-right: 1px solid black; padding: 5px 10px;">-9</td> <td style="border-right: 1px solid black; padding: 5px 10px;">4</td> <td style="padding: 5px 10px;">0</td> </tr> </table> <table style="margin: auto; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 5px 10px;">1</td> <td style="border-right: 1px solid black; padding: 5px 10px;">6</td> <td style="padding: 5px 10px;">5</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px 10px;">-1</td> <td style="border-right: 1px solid black; padding: 5px 10px;">-1</td> <td style="padding: 5px 10px;">-5</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px 10px;">1</td> <td style="border-right: 1px solid black; padding: 5px 10px;">5</td> <td style="padding: 5px 10px;">0</td> </tr> </table>	2	-7	-5	4	-1	-2	9	-4	2	-9	4	0	1	6	5	-1	-1	-5	1	5	0
2	-7	-5	4																			
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$$\begin{aligned}
& \lim_{x \rightarrow 1} \frac{3x^2 - x - 2}{\sqrt{7 - 3x} - 2} = \frac{0}{0} \\
& \lim_{x \rightarrow 1} \frac{3x^2 - x - 2}{\sqrt{7 - 3x} - 2} \cdot \frac{\sqrt{7 - 3x} + 2}{\sqrt{7 - 3x} + 2} \\
& \lim_{x \rightarrow 1} \frac{(3x + 2)(\sqrt{7 - 3x} + 2)}{-3} \qquad \left| \begin{array}{c|cc} & 3 & -1 & -2 \\ \hline 1 & 3 & 2 & 2 \\ \hline & 3 & 2 & 0 \end{array} \right. \\
& \lim_{x \rightarrow 1} \frac{(3(1) + 2)(\sqrt{7 - 3(1)} + 2)}{-3} = -\frac{20}{-3}
\end{aligned}$$

Ejercicio 3

Dada la siguiente función:

$$f(x) = \begin{cases} \frac{6x^3 + 23x^2 + 26x - 8}{x^2 - x - 2} & , \text{ si } x < 2 \\ 2 & , \text{ si } x = 2 \\ \frac{x - 2}{\sqrt{x - 1} - 1} & , \text{ si } x > 2 \end{cases}$$

¿Es continua en $x = 2$?

$$\begin{aligned}
& \lim_{x \rightarrow 2} \frac{6x^2 + 11x + 4}{x + 1} \qquad \left| \begin{array}{c|ccc} & 6 & -23 & 26 & -8 \\ \hline 2 & 12 & -22 & 8 \\ \hline & 6 & -11 & 4 & 0 \end{array} \right. \\
& \frac{6(2)^2 - 11(2) + 4}{3} \\
& \frac{24 - 22 + 4}{3} = \frac{6}{3} = 2
\end{aligned}$$

$$\begin{aligned}
& \lim_{x \rightarrow 2} \frac{(x - 2)(\sqrt{x - 1} + 1)}{x - 2} \qquad \left| \begin{array}{c|cc} & 1 & -1 & -2 \\ \hline 2 & 2 & 2 & 2 \\ \hline & 1 & 1 & 0 \end{array} \right. \\
& (\sqrt{2 - 1} + 1) = 2
\end{aligned}$$

Respuesta:

Si es continua en $x = 2$

Ejercicio 4

Dada la siguiente función:

$$f(x) = \begin{cases} \frac{2x^3 + 7x^2 - 14x + 5}{x - 1} & , \text{ si } x < 1 \\ 6 & , \text{ si } x = 1 \\ \frac{\sqrt{17-x} + 8}{x^2 + 1} & , \text{ si } x > 1 \end{cases}$$

¿Es continua en $x = 1$?

$$\begin{array}{l} \lim_{x \rightarrow 1} 2x^2 + 9x - 5 \quad \left| \begin{array}{c|ccc|c} & 2 & 7 & -14 & -5 \\ \hline 1 & 2 & 9 & -5 & -5 \\ \hline & 2 & 9 & -5 & 0 \end{array} \right. \\ 2 + 9 - 5 = 6 \end{array}$$

Respuesta:

Si es continua en $x = 1$