PRÁCTICA CALIFICADA 1

Apellidos y Nombres : ……………………………………………………………………………………………

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1. **(7 puntos)** Halle si existe $\underset{x\to 27}{Lím}\ \dfrac{\sqrt{6+\sqrt[3]{x}}-3}{x^2-27x}$

SOLUCION

$$\underset{x\to 27}{Lím}\ \frac{\sqrt{6+\sqrt[3]{x}}-3}{x^2-27x}=\underset{x\to 27}{Lím}\ \frac{\left(\sqrt{6+\sqrt[3]{x}}-3\right)\left(\sqrt{6+\sqrt[3]{x}}+3\right)}{x(x-27)\left(\sqrt{6+\sqrt[3]{x}}+3\right)}$$

$$\underset{x\to 27}{Lím}\ \frac{\sqrt{6+\sqrt[3]{x}}-3}{x^2-27x}=\underset{x\to 27}{Lím}\ \frac{\left(\sqrt[3]{x}-3\right)}{x(x-27)}=\underset{x\to 27}{Lím}\ \frac{\left(\sqrt[3]{x}-3\right)\left(\sqrt[3]{x^2}+3\sqrt[3]{x}+9\right)}{x(x-27)\left(\sqrt{6+\sqrt[3]{x}}+3\right)\left(\sqrt[3]{x^2}+3\sqrt[3]{x}+9\right)}$$

$$\underset{x\to 27}{Lím}\ \frac{\sqrt{6+\sqrt[3]{x}}-3}{x^2-27x}=\underset{x\to 27}{Lím}\ \frac{\left(\sqrt[3]{x}-3\right)}{x(x-27)}=\underset{x\to 27}{Lím}\ \frac{\left(\sqrt[3]{x}-3\right)\left(\sqrt[3]{x^2}+3\sqrt[3]{x}+9\right)}{x(x-27)\left(\sqrt{6+\sqrt[3]{x}}+3\right)\left(\sqrt[3]{x^2}+3\sqrt[3]{x}+9\right)}$$

$$\underset{x\to 27}{Lím}\ \frac{\sqrt{6+\sqrt[3]{x}}-3}{x^2-27x}=\underset{x\to 27}{Lím}\ \frac{(x-27)}{x(x-27)\left(\sqrt{6+\sqrt[3]{x}}+3\right)\left(\sqrt[3]{x^2}+3\sqrt[3]{x}+9\right)}$$

$$\underset{x\to 27}{Lím}\ \frac{\sqrt{6+\sqrt[3]{x}}-3}{x^2-27x}=\underset{x\to 27}{Lím}\ \frac{1}{x\left(\sqrt{6+\sqrt[3]{x}}+3\right)\left(\sqrt[3]{x^2}+3\sqrt[3]{x}+9\right)}$$

$$\underset{x\to 27}{Lím}\ \frac{\sqrt{6+\sqrt[3]{x}}-3}{x^2-27x}=\underset{x\to 27}{Lím}\ \frac{1}{x\left(\sqrt{6+\sqrt[3]{x}}+3\right)\left(\sqrt[3]{x^2}+3\sqrt[3]{x}+9\right)}$$

$$\underset{x\to 27}{Lím}\ \frac{\sqrt{6+\sqrt[3]{x}}-3}{x^2-27x}=\frac{1}{27(6)(27)}$$

$$\underset{x\to 27}{Lím}\ \frac{\sqrt{6+\sqrt[3]{x}}-3}{x^2-27x}=\frac{1}{4374}$$

2. **(6 puntos)** Halle si existe $\underset{x\to 1}{Lím}\ \dfrac{3-|x-1|}{2|x-1|+3}$

SOLUCION

$$\frac{3-|x-1|}{2|x-1|+3}=\begin{cases}\dfrac{3-(x-1)}{2(x-1)+3}; & x-1\geq 0\\ \dfrac{3-(-x+1)}{2(-x+1)+3}; & x-1<0\end{cases}$$

$$\frac{3-|x-1|}{2|x-1|+3}=\begin{cases}\dfrac{4-x}{2x+1}; & x\geq 1\\ \dfrac{2+x}{-2x+5}; & x<1\end{cases}$$

$$\underset{x\to 1^+}{Lím}\ \frac{3-|x-1|}{2|x-1|+3}=\underset{\substack{x\to 1\\ x>1}}{Lím}\ \frac{4-x}{2x+1}=\frac{3}{3}=1$$

$$\underset{x\to 1^-}{Lím}\ \frac{3-|x-1|}{2|x-1|+3}=\underset{\substack{x\to 1\\ x<1}}{Lím}\ \frac{2+x}{-2x+5}=\frac{3}{3}=1$$

$$\therefore \exists\,\underset{x\to 1}{Lím}\ \frac{3-|x-1|}{2|x-1|+3}=1$$

3. **(7 puntos)** Halle si existe $\lim\limits_{x\to 0} \dfrac{2-\sqrt{\cos(sen(2x))}-\sqrt{1-sen^2 x}}{x^2\cos x}$

SOLUCION

$$\lim_{x\to 0} \frac{2-\sqrt{\cos(sen(2x))}-\sqrt{1-sen^2 x}}{x^2\cos x} = \lim_{x\to 0} \frac{\left(1-\sqrt{\cos(sen(2x))}\right)+(1-\cos x)}{x^2\cos x}$$

$$= \lim_{x\to 0} \frac{\left(1-\sqrt{\cos(sen(2x))}\right)}{x^2\cos x} + \frac{1-\cos x}{x^2\cos x}$$

$$= \lim_{x\to 0} \frac{\left(1-\sqrt{\cos(sen(2x))}\right)\left(1+\sqrt{\cos(sen(2x))}\right)}{x^2\cos x\left(1+\sqrt{\cos(sen(2x))}\right)} + \frac{1-\cos x}{x^2}.\frac{1}{\cos x}$$

$$= \lim_{x\to 0} \frac{\dfrac{1-\left(\cos(sen(2x))\right)}{sen^2(2x)}}{\dfrac{x^2}{sen^2(2x)}.\left(1+\sqrt{\cos(sen(2x))}\right)} + \frac{1-\cos x}{x^2}.\frac{1}{\cos x}$$

$$= \lim_{x\to 0} \frac{4\dfrac{sen^2(2x)}{4x^2}.\dfrac{1-\left(\cos(sen(2x))\right)}{sen^2(2x)}}{\left(1+\sqrt{\cos(sen(2x))}\right)} + \frac{1-\cos x}{x^2}.\frac{1}{\cos x}$$

$$= \lim_{x\to 0} \frac{4.\dfrac{sen(2x)}{2x}.\dfrac{sen(2x)}{2x}.\dfrac{1-\left(\cos(sen(2x))\right)}{sen^2(2x)}}{\left(1+\sqrt{\cos(sen(2x))}\right)} + \frac{1-\cos x}{x^2}.\frac{1}{\cos x}$$

$$= \frac{4(1)(1)\left(\dfrac{1}{2}\right)}{(2)} + \frac{1}{2}.1$$

$$\lim_{x\to 0} \frac{2-\sqrt{\cos(sen(2x))}-\sqrt{1-sen^2 x}}{x^2\cos x} = \frac{3}{2}$$