Monitoria

DIVIDIR POR x – a raiz

m) $\lim_{x\to 10} \dfrac{x^{27}-10^{27}}{x^{26}-10^{26}} \to \dfrac{\frac{x^{27}-10^{27}}{x-10}}{\frac{x^{26}-10^{26}}{x-10}} \to \dfrac{x^{26}+10x^{25}+10^2x^{24}\dots+10^{26}}{x^{25}+10x^{24}+10^2x^{23}+\dots+10^{25}}$

binomio de newton

$(x^n \cdot y^{n-n})$

$$\begin{array}{l|l} x^{27} - 10^{27} & x-10 \\ \hline -x^{27} + 10x^{26} & 10^0x^{26}+10^1x^{25}+10^2x^{24}\dots \\ \hline +\cancel{10x^{26}} - 10^{27} & \\ -\cancel{10x^{26}} + 10^2 \cdot x^{25} & \\ \hline +10^2x^{25} - 10^{27} & \\ -10^2x^{25} + 10^3x^{24} & \\ \hline +10^3x^{24} - 10^{27} & \end{array}$$

$10^{26}x - 10^{27}$

soma e todos positivos

$= \lim_{x\to 10} \dfrac{x^{26}+10x^{25}+\dots+10^{26}}{x^{25}+10x^{24}+\dots+10^{25}}$

de 26 a 0 temos 27 nº

$= \dfrac{\overbrace{10^{26}}^{10^{26}} + \overbrace{10\cdot 10^{25}}^{} + \dots + \overbrace{10^{26}}^{10^{26}}}{\underbrace{10^{25}}_{10^{25}} + \underbrace{10\cdot 10^{24}}_{10^{25}} + \dots + 10^{25}} = \dfrac{27\cdot \cancel{10^{26}}^{10}}{26\cdot \cancel{10^{25}}}$

$= \dfrac{270}{26} = \boxed{\dfrac{135}{13}}$

---

h) $\lim_{x\to -1} \dfrac{\sqrt[3]{x}+1}{x+1} = \lim_{x\to -1} \dfrac{\overbrace{\sqrt[3]{x}+\sqrt[3]{1}}^{a+b}}{\underbrace{(\sqrt[3]{x})^3+(\sqrt[3]{1})^3}_{a^3+a^3}} \cdot \dfrac{((\sqrt[3]{x})^2-\sqrt[3]{x}\cdot 1+1^2)}{((\sqrt[3]{x})^2-\sqrt{x}\cdot 1+1^2)} = \lim_{x\to -1} \dfrac{(\sqrt[3]{x})^3+1^3}{x+1} \cdot \dfrac{1}{\underbrace{(\sqrt[3]{x})^2-\sqrt[3]{x}+1^2}_{(\sqrt[3]{-1})^2-\sqrt[3]{-1}+1^2}} \to \boxed{\dfrac{1}{3}}$

$1+1+1=3$

$a^3+b^3 = (a+b)(a^2-ab+b^2)$

$a^3-b^3 = (a-b)(a^2+ab+b^2)$

---

k) $\lim_{x\to 1/2} = \dfrac{\left(\frac{1}{2}\right)^2-\frac{3}{2}\cdot\frac{1}{2}+1}{2\cdot\frac{1}{2}-1} = \dfrac{\frac{1}{4}-\frac{3}{4}+1}{1-1} = \dfrac{0{,}5}{0} = \cancel{\exists}$

$\lim_{x\to 0{,}5^+} \dfrac{x^2-\frac{3x}{2}+1}{2x-1} \; \dfrac{(+)}{(+)} = +\infty$ | $\lim_{x\to 0{,}5^-} \dfrac{x^2-\frac{3x}{2}+1}{2x-1} \; \dfrac{(+)}{(-)} = -\infty$

---

d) $\lim_{z\to 1} \dfrac{\sqrt[3]{z}-1}{\sqrt{z}-1} \cdot \dfrac{\sqrt[3]{z}+\sqrt[3]{z}+1}{(\sqrt{z}+1)} \cdot \dfrac{(\sqrt{z}+1)}{\sqrt[3]{z}+\sqrt[3]{z}+1} = \lim_{z\to 1} \dfrac{(\cancel{z-1})(z+1)}{(\cancel{z-1})(\sqrt[3]{z}+\sqrt[3]{z}+1)}$

$\lim_{z\to 1} \dfrac{(\sqrt{z}+1)}{(\sqrt[3]{z^2}+\sqrt[3]{z}+1)} = \dfrac{2}{3}$

substitui

$$\lim_{x \to 1/3} \frac{x^2 - \frac{10x}{3} + 1}{3x - 1} = \frac{\left(\frac{1}{3}\right)^2 - \frac{10}{3}\,\frac{1}{3} + 1}{3 \cdot \frac{1}{3} - 1} = \frac{\overbrace{\frac{1}{9} - \frac{10}{9}}^{-\frac{9}{9} = -1} + 1}{1 - 1} = \frac{-1 + 1}{1 - 1} = \frac{0}{0}$$

$$\lim_{x \to 1/3} \frac{\left(x^2 - \frac{10x}{3} + 1\right)}{3\left(x - \frac{1}{3}\right)} = \lim_{x \to 1/3} \frac{x - 3}{3} = \frac{\frac{1}{3} - \frac{3}{1}}{3} = \frac{\frac{1-9}{3}}{3} = \boxed{\frac{-8}{9}}$$

$$\begin{array}{l|l}
x^2 - \frac{10x}{3} + 1 & x - \frac{1}{3} \\ \cline{2-2}
-x^2 + \frac{x}{3} & x - 3 \\ \cline{1-1}
0 - \frac{9}{3}x + 1 & \\
0 - 3x + 1 & \\
+ 3x - 1 & \\ \cline{1-1}
0 &
\end{array}$$