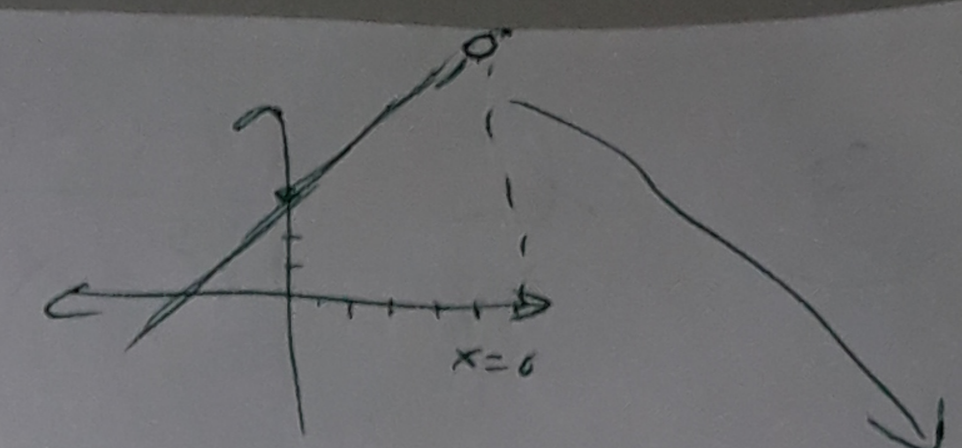
① $f(x) = \begin{cases} \dfrac{x^2-3x-18}{x-6} & x \neq 6 \\ 9 & x = 6 \end{cases}$



analizamos $y = \dfrac{x^2-3x-18}{x-6} = \dfrac{(x-6)(x+3)}{x-6} = x+3$ es una recta pero indeterminado en $x=6$

pero el hueco se llena con $f(6) = 9$

∴ es continua $\forall x$, $\mathbb{R}$: $(-\infty, \infty)$

② Gráfico

a) $\lim_{x \to 6} f(x) = 0$ b) $\lim_{x \to -1^+} f(x) = -1$ c) $\lim_{x \to -1^-} f(x) = 2$

d) $\lim_{x \to -1} f(x) = \nexists$, $-1 \neq 2$ e) $\lim_{x \to 4^+} f(x) = 0$

f) $\lim_{x \to 4^-} f(x) = \infty$ g) $\lim_{x \to 4} f(x) = \nexists$ $0 \neq \infty$

h) $\lim_{x \to \infty} f(x) = 2$ i) $\lim_{x \to -\infty} f(x) = -2$

③ $\lim_{v \to 6} \dfrac{\frac{1}{v} - \frac{1}{6}}{v-6} = \lim_{v \to 6} \dfrac{\frac{6-v}{6v}}{v-6} = \lim_{v \to 6} \dfrac{6-v}{6v(v-6)} = \lim_{v \to 6} \dfrac{-(v-6)}{6v(v-6)} = \dfrac{-1}{6(6)} = -\dfrac{1}{36}$

④ $\lim_{x \to 6} \dfrac{2x^2-15x+18}{x^3-216} = \lim_{x \to 6} \dfrac{(x-6)(2x-3)}{(x-6)(x^2+6x+36)} = \dfrac{2(6)-3}{(6)^2+6(6)+36} = \dfrac{9}{108} = \dfrac{1}{12}$

⑤ Continuidad de $y = \dfrac{x+7}{x^2-10x+21} = \dfrac{x+7}{(x-7)(x-3)}$ es discontinua en las asintotas verticales en $x=7$ y $x=3$

∴ "y" es continua $(-\infty, 3) \cup (3, 7) \cup (7, \infty)$

⑥ $\lim_{x \to 2} \dfrac{x^2-2x}{4-x^2} = \lim_{x \to 2} \dfrac{x(x-2)}{(2-x)(2+x)} = \lim_{x \to 2} \dfrac{-x(2-x)}{(2-x)(2+x)} = -\dfrac{1}{2}$

⑦ $\lim_{u \to 2} \dfrac{u^3-8}{u^4-16} = \lim_{u \to 2} \dfrac{(u-2)(u^2+2u+4)}{(u^2-4)(u^2+4)} = \lim_{u \to 2} \dfrac{(u-2)(u^2+2u+4)}{(u+2)(u-2)(u^2+4)}$

$\lim_{u \to 2} f(u) = \dfrac{2^2+2(2)+4}{(2+2)(2^2+4)} = \dfrac{12}{32} = \dfrac{3}{8}$

(8) $\lim_{x \to \frac{1}{4}} \frac{64x^3-1}{4x^3-x^2} = \lim_{x \to \frac{1}{4}} \frac{\cancel{(4x-1)}(16x^2+4x+1)}{x^2\cancel{(4x-1)}} = \frac{16(\frac{1}{4})^2+4(\frac{1}{4})+1}{(\frac{1}{4})^2(}$

$\lim_{x \to \frac{1}{4}} f(x) = \frac{1+1+1}{\frac{1}{16}} = 48$

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(9) $\lim_{x \to 1} \frac{\sqrt{x^2+35}-6}{x-1} \left(\frac{\sqrt{x^2+35}+6}{\sqrt{x^2+35}+6}\right) = \lim_{x \to 1} \frac{x^2+35-36}{(x-1)(\sqrt{x^2+35}+6)}$

$\lim_{x \to 1} f(x) = \lim_{x \to 1} \frac{x^2-1}{(x-1)(\sqrt{x^2+35}+6)} = \lim_{x \to 1} \frac{(x+1)\cancel{(x-1)}}{\cancel{(x-1)}(\sqrt{x^2+35}+6)} = \frac{2}{12} = \frac{1}{6}$

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(10) a) $\lim_{x \to \infty} \frac{4x^4}{19x^4+15x^3+8x^2} \left(\frac{\frac{1}{x^4}}{\frac{1}{x^4}}\right) = \lim_{x \to \infty} \frac{4}{19+\frac{15}{x}+\frac{8}{x^2}} = \frac{4}{19}$

en $-\infty$ ocurre lo mismo

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(11) $\lim_{x \to 1^+} \frac{1}{x-1} = \frac{1}{0^+} = +\infty$