① José Luis Sandoval Perez
1A ICI

a) $\lim_{x\to 2} \frac{\sqrt{x}-2}{x-4}$

$= \frac{\lim_{x\to 2} \sqrt{x} - \lim_{x\to 2} 2}{\lim_{x\to 2} x - \lim_{x\to 2} 4} = \frac{\sqrt{2}-2}{2-4} = \frac{\sqrt{2}-\cancel{2}}{-\cancel{2}} = \sqrt{2}$

b) $\lim_{x\to \infty} \frac{2x^2+5x}{3x^2-4x+13}$

$= \frac{\lim_{x\to\infty} 2x^2 + \lim_{x\to\infty} 5x}{\lim_{x\to\infty} 3x^2 - \lim_{x\to\infty} 4x + \lim_{x\to\infty} 13} = \frac{2(\infty)^2+5(\infty)}{3(\infty)^2-4(\infty)+13} = \frac{\infty+\infty}{\infty-\infty+13} = \frac{\infty}{13}$

$= 0$

②

a) $\lim_{x\to 2} -\frac{1}{2}x+4 = \lim_{x\to 2} -\frac{1}{2}x + \lim_{x\to 2} 4 = -\frac{1}{2}(2)+4 = 1+4 = 5$

b) $\lim_{x\to 2^-} -\frac{1}{2}x+4 = \lim_{x\to 2^-} -\frac{1}{2}x + \lim_{x\to 2^-} 4 = -\frac{1}{2}(2)+4 = 1+4 = 5$

$\lim_{x\to 2^+} \frac{1}{2}x+2 = \lim_{x\to 2^+} \frac{1}{2}x + \lim_{x\to 2^+} 2 = \frac{1}{2}(2)+2 = 1+2 = 3$

$5 = \lim_{x\to 2^-} -\frac{1}{2}x+4 \neq \lim_{x\to 2^+} \frac{1}{2}x+4 = 3$

$\downarrow$

No existe el limite

$f(a) = f(2)$

$f(2) = \lim_{x\to 2} -\frac{1}{2}x+4 = -\frac{1}{2}(2)+4 = 5$

No es continua

(3)

a) $\lim_{x\to 0} \sqrt{9-x^2} = \sqrt{\left(\lim_{x\to 0} 9 - \lim_{x\to 0} x^2\right)} = \sqrt{(9-0^2)} = \sqrt{9} = \underline{3}$

b) $\lim_{x\to 2} \frac{1}{(3x^2+4)^3} = \frac{\lim_{x\to 2} 1}{\left(\lim_{x\to 2} 3x^2 + \lim_{x\to 2} 4\right)^3} = \frac{1}{(3(2)^2+4)^3} = \frac{1}{(12+4)^3} = \frac{1}{(16)^3}$

$= \underline{\frac{1}{4096}}$

c) $\lim_{x\to 1} \tan(1-x^2) = \mathrm{Tan}\left(\lim_{x\to 1} 1 - \lim_{x\to 1} x^2\right) = \mathrm{Tan}(1-1) = \mathrm{Tan}(0)$

$= \underline{0}$

(4)

a) $f(x) = \frac{2}{x^2-4x}$ $=$ $\lim_{x\to 4} \frac{2}{x^2-4x} = \frac{\lim 2}{\lim_{x\to 4} x^2 - \lim_{x\to 4} 4x} = \frac{2}{(4)^2-4(4)}$

en $x=4$

$x^2-4x = x(x-4)$ $\quad = \frac{2}{0} = \underline{0}$

$x-4=0$

$\underline{x=4}$, $D_F = \mathbb{R}-\{4\}$

① $4 \neq D_F$
② Existe limite
③ $f(4) = 0 = \lim_{x\to 4} f(x) = \frac{2}{x^2-4x} = 0$

La primera condición no se cumple, por lo tanto <u>no es continua</u>

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b) $f(x) = \frac{-8x}{x^2 - 4x}$ $= \lim_{x\to 2} \frac{-8x}{x^2-4x} = \frac{\lim_{x\to 2} -8x}{\lim_{x\to 2} x^2 - \lim_{x\to 2} 4x} = \frac{-8(2)}{(2)^2 - 4(2)} = \frac{16}{4-8}$

$x = 2$

$x^2 - 4x$

$x(x-4) = 0$

$x = 4$

$D_f = \mathbb{R} - \{4\}$

$= \frac{16}{-4} = \underline{-4}$

① $2 \in D_f$ ✓

② $\lim f(x) = -4$ ✓ Existe

③ $\lim f(x) = -4 = f(2) = -4$ ✓

$\boxed{\text{Es continua en } x = 2}$

③

a) $f(x) = \frac{x-3}{x^2 - 20x + 36}$

b) $f(x) = \frac{\overbrace{\sqrt{4-x}}^{h(x)}}{\underbrace{x-2}_{g(x)}}$

$D_h(x) = [-\infty, 4]$

$D_g(x) = \mathbb{R} - \{2\}$

$x - 2 = 0$

$x = 2$

$D_g(x) = \mathbb{R} - \{2\}$

$4 - x = 0$

$x = 4$

$D_h(x) : [-\infty, 4)$

Es continua en $\boxed{x \in [-\infty, 4] - \{2\}}$

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