1) $\lim_{x \to -1} x e^{\frac{1}{x^2-1}} = -\infty$ $\quad e^{\frac{1}{x}} \to 0$ $\quad e \to +\infty$

2) $f(x) = \begin{cases} x^2 - 1 & x \leq 2 \\ e^x & x > 2 \end{cases}$ $\quad \lim_{x \to 2^-} x^2 - 1 = 3 \quad \lim_{x \to 2^+} e^x = e^2$

3) $f(x) = 3 - x^2 + x^3 \quad : [-1, 2] \to \mathbb{R}$

$f(-1) = 3 - 1 - 1 = 1$

$f(2) = 3 - 4 + 8 = 7$

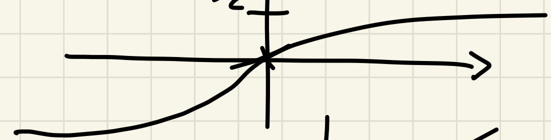
per teorema di weierstrass assume sicuramente valore 2

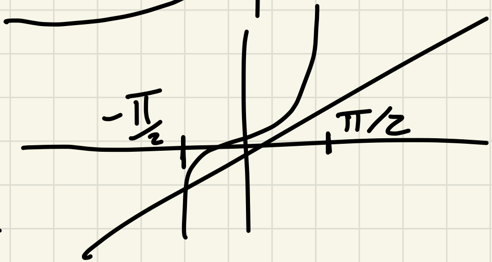
$f'(x) = 3x^2 - 2x$

$3x^2 - 2x = 0 \quad x(3x - 2) \quad x = 0 \vee x = \frac{2}{3}$

4) $\lim\limits_{x\to 1^-} \ln\left(\frac{\pi}{2} + \underbrace{\arctan \underbrace{\frac{1}{x-1}}_{\to -\infty}}_{\to -\pi/2}\right) =$ $\quad x-1 \to 0^-$

$$= \ln\left(\frac{\pi}{2} - \frac{\pi}{2}\right) = \ln 0 \to -\infty$$





5) $\lim\limits_{x\to -\infty} \dfrac{\sqrt{2x^2-1} - x}{|x|} = \lim\limits_{x\to -\infty} \dfrac{\sqrt{2x^2-1} - x}{|x|}$

$$\frac{|x|\sqrt{2 - \underbrace{\frac{1}{x^2}}_{\to 0}} - x}{|x|} = \frac{\left(|x|\sqrt{2} - x\right)}{|x|} = \frac{-x\sqrt{2} - x}{-x} =$$

$$\frac{\cancel{x}\left(-\sqrt{2} - 1\right)}{-\cancel{x}} = \sqrt{2} + 1$$

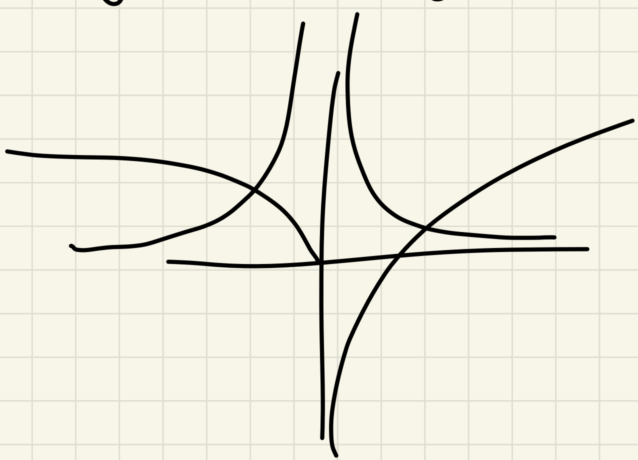
6)

$$f(x) = \begin{cases} ax+2 & x \leq -1 \\ \ln(x^2+x+1) & x > -1 \end{cases}$$

$$\lim_{x \to -1^-} ax+2 = \lim_{x \to -1^+} \ln(x^2+x+1) = 0 \qquad -a+2=0 \qquad a=2$$

7) $$\lim_{x \to 0^+} \left(e^{\frac{1}{x^2}} - e^{\frac{1}{x}} - \ln x\right) = \lim_{x \to 0^+} -\ln x = +\infty$$

gerarchia degli infiniti



8)

$$f(x) = \begin{cases} 2x+3 & -2 \leq x < 0 \\ 2x+2 & 0 \leq x \leq 2 \end{cases}$$

$f'(x) =$