NUM ....

PROVA N.1 - 6 ABR 2017
MS123
Prof. Stefano De Leo
DMA/UNICAMP

NOME ....

RA ....

$\boxed{1 - 0.5}$

Determine a derivada da função

$$\frac{\sqrt{\exp[x^2]+3x^3}}{(x^2+1)^{3/2}\exp[x^3+2x]}$$

$$\frac{N}{D} \rightarrow \frac{N'D-ND'}{D^2}$$

$$N=\left(e^{x^2}+3x^2\right)^{\frac{1}{2}}$$

$$N'=\frac{1}{2}\left(e^{x^2}+3x^2\right)^{-\frac{1}{2}}\underbrace{\left(e^{x^2}+3x^2\right)'}_{2xe^{x^2}+6x}$$

$$D=(x^2+1)^{3/2}\,e^{x^3+2x}$$

$$D'=\frac{3}{2}(x^2+1)^{\frac{1}{2}}\underbrace{(x^2+1)'}_{(2x+1)}\,e^{x^3+2x}+(x^2+1)^{3/2}\,e^{x^3+2x}\underbrace{(x^3+2x)'}_{(3x^2+2)}$$

$\boxed{2 - 0.5}$

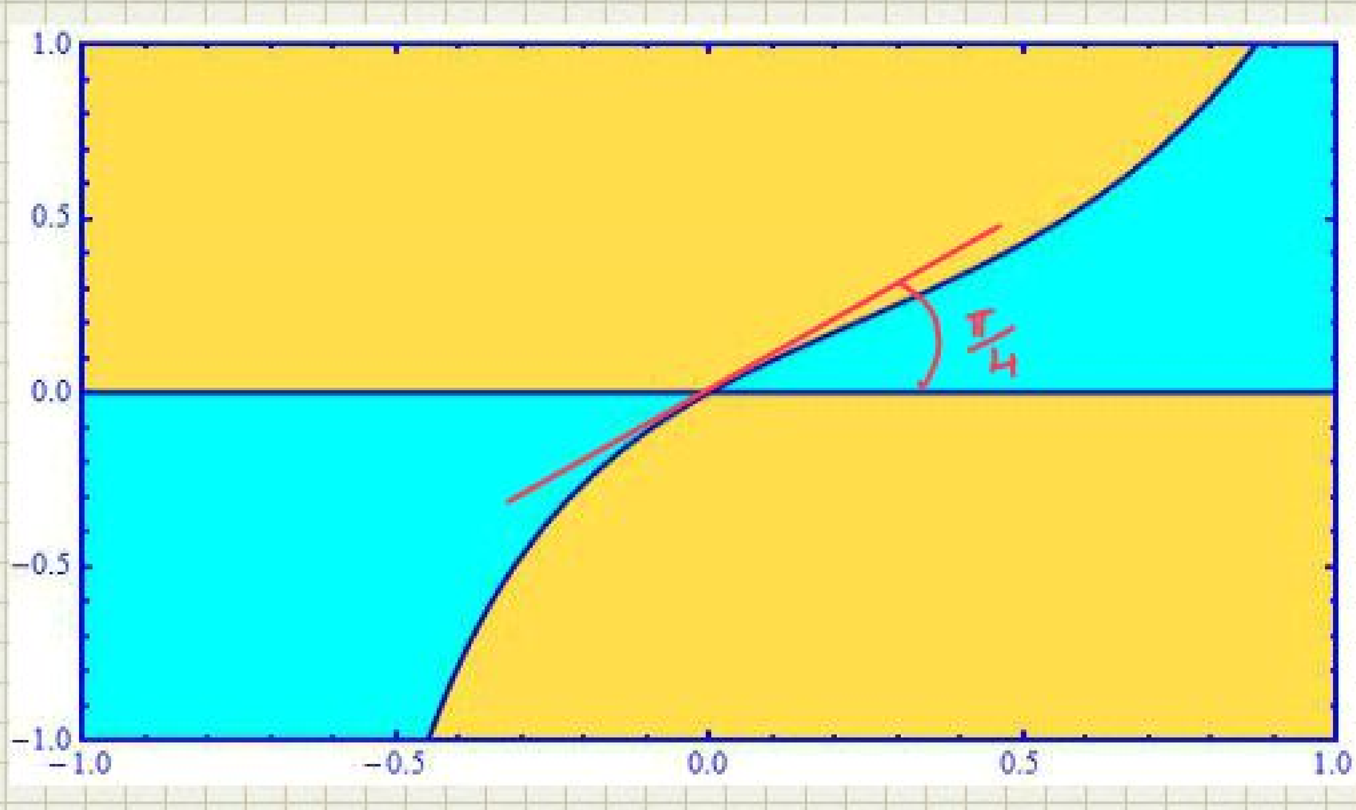
Determine o ângulo que a tangente à função

$$\frac{x\exp[x^2]}{x+1}$$

forma, no ponto $x=0$, com o eixo x.

$$\frac{\left(xe^{x^2}\right)'(x+1)-xe^{x^2}(x+1)'}{(x+1)^2}=\frac{\left(e^{x^2}+2x^2e^{x^2}\right)(x+1)-xe^{x^2}}{(x+1)^2}$$

EM $x=0$ TEMOS $f'(0)=1$ $\quad \tan\alpha=1 \Rightarrow \alpha=\frac{\pi}{4}$



3 - 3 (0.5+1.0+1.5)

Estude e esboce o gráfico das funções

$$f(x) = x^3 - \frac{15}{2}x^2 + 12x + 3\,,$$

$$g(x) = \frac{\sqrt{(x^2-9)(2-x)}}{x+3}\,,$$

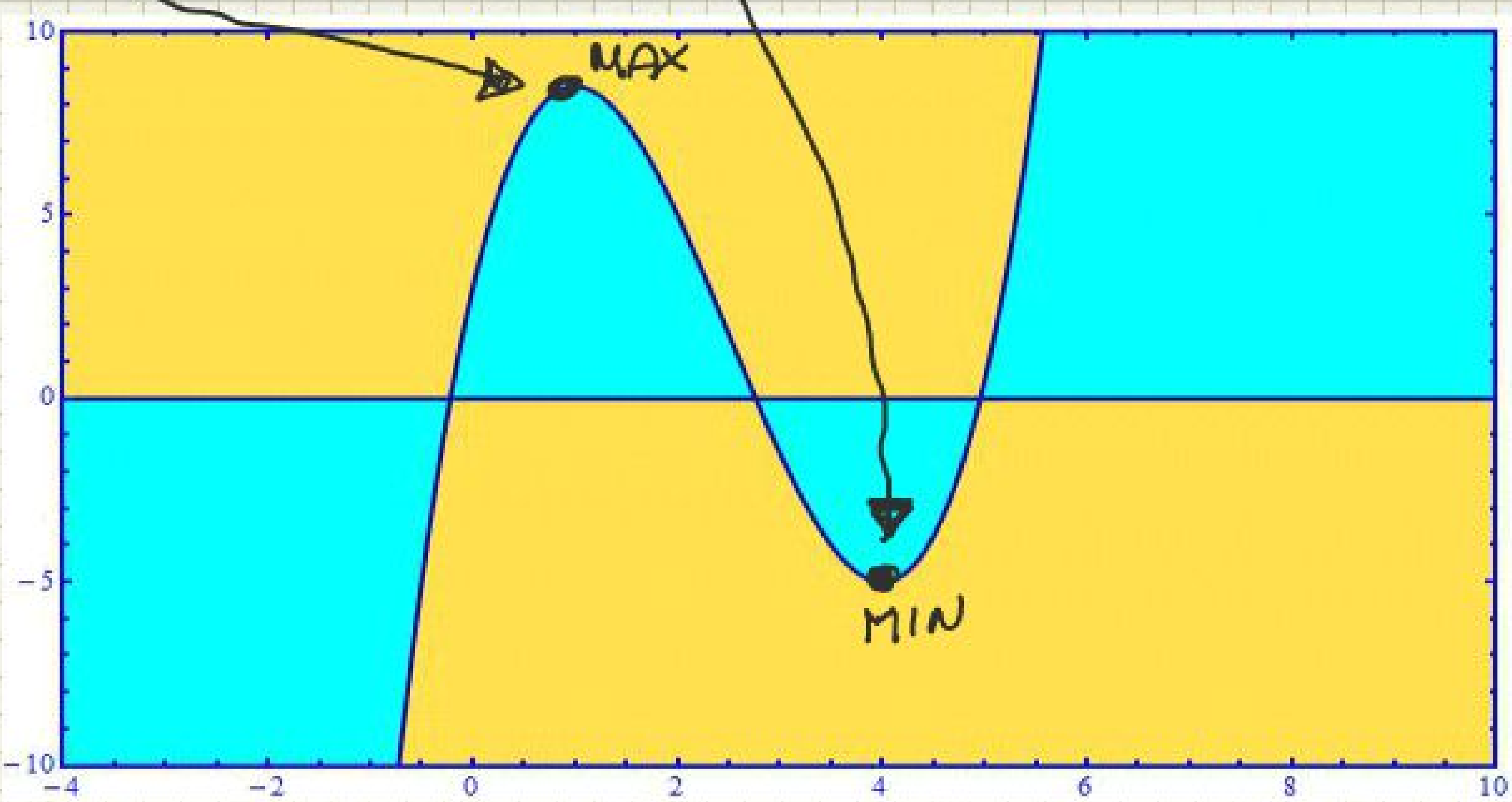
$$h(x) = \frac{\sqrt{(x^2-4)}\;e^x}{(x-3)(x-2)}\,.$$

$f(x)$ $\quad x \to \pm\infty$: x^3 $\quad \boxed{(\pm\infty, \pm\infty)}$

$f'(x) = 0$: MAX E MIN $\quad 3x^2 - 15x + 12 = 0 \Rightarrow x^2 - 5x + 4 = 0$

$x = 1, 4$ $\quad$ 1 MAX $\quad$ 4 MIN

$\boxed{(1, \tfrac{17}{2}) \text{ MAX} \qquad (4, -5) \text{ MIN}}$



$g(x) = \dfrac{\sqrt{(x^2-9)(2-x)}}{x+3}$ $\quad$ DOMÍNIO

+	−3	2	3
+	−	+	−

$x \to -\infty$ $\quad g(x) : \dfrac{\sqrt{-x^3}}{x} \to -\infty$ $\quad \boxed{(-\infty, -\infty)}$

ZEROS $\boxed{(2, 0) \text{ E } (3, 0)}$ $\quad \to$ ASSÍNTOTA -3^- $\quad \boxed{(-3^-, -\infty)}$

$\pm\infty$

$g'(x) = 0$ $\quad \dfrac{1}{2\sqrt{\ }}(-x^3 + 2x^2 + 9x - 18)'(x+3) - \sqrt{\ }\,(x+3)' = 0$

$(-3x^2+4x+9)(\cancel{x+3}) - 2(x-3)(\cancel{x+3})(2-x) = 0$

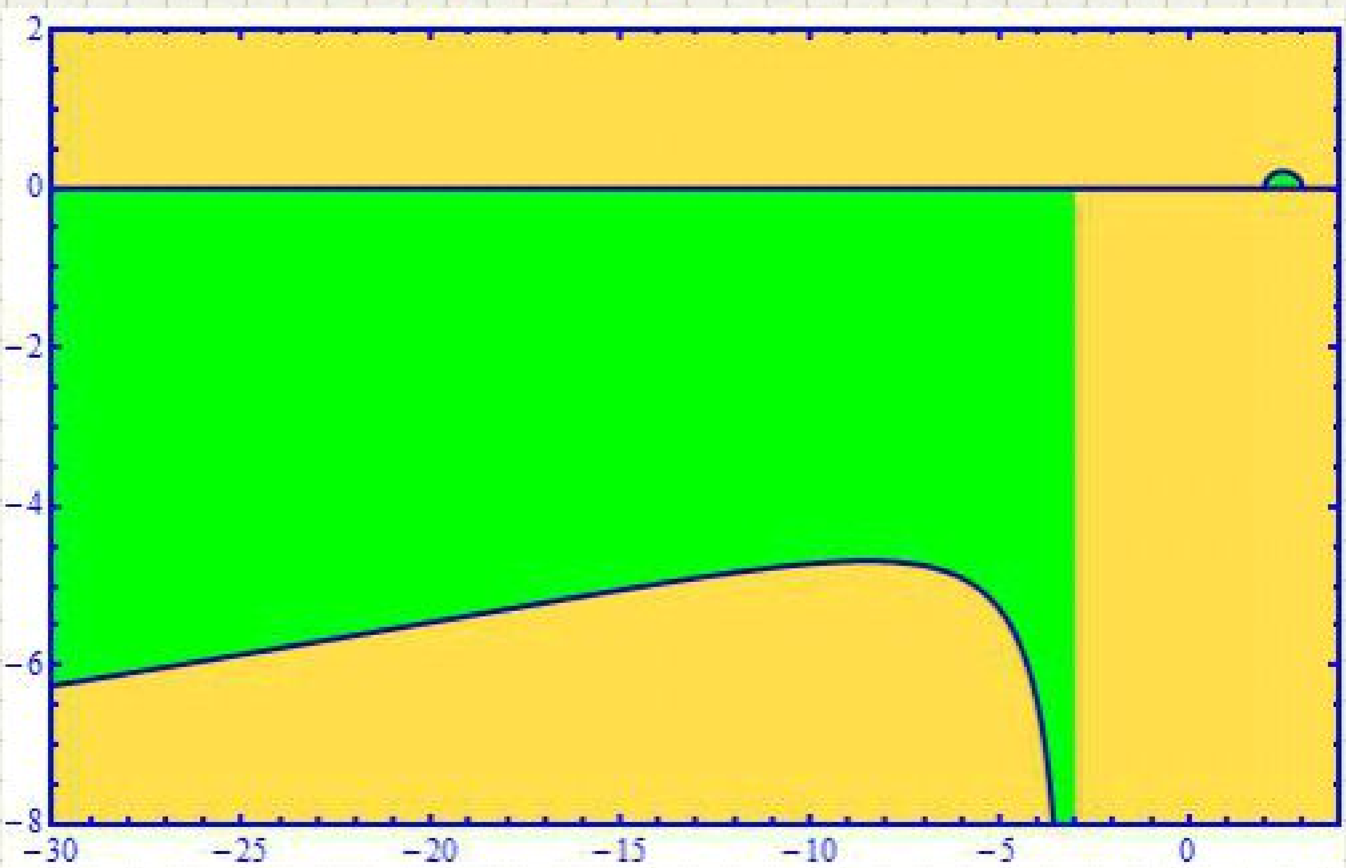
$-3x^2 + \cancel{4}x + 9 - \cancel{4}x + 2x^2 + 12 - 6x = 0$

$-x^2 - 6x + 21 = 0 \qquad x_{1,2} = -3 \pm \sqrt{30}$

2 MÁXIMOS $\qquad -3-\sqrt{30} \sim -8.48$

$-3+\sqrt{30} \sim 2.48$

$$\boxed{\text{MÁXIMOS} \quad (-8.48, -4.69) \quad (2.48, 0.21)}$$



$h(x) = \dfrac{\sqrt{(x^2-4)}\; e^x}{(x-3)(x-2)}$

DOMÍNIO $\quad + \;\; -2 \;////\; 2 \;\; +$

$x \to \pm\infty \quad h(x): \dfrac{\sqrt{x^2}\, e^x}{x^2} \qquad \boxed{(-\infty, 0^+) \quad (+\infty, +\infty)}$

ZERO $\boxed{(-2, 0)}$

ASSÍNTOTAS $\left(3^-, \frac{+}{-+}\infty\right) \quad \left(3^+, \frac{+}{++}\infty\right) \quad \left(2^+, \frac{+}{-+}\infty\right)$

$$\boxed{\begin{matrix} 2^+, -\infty \\ 3^-, -\infty \\ 3^+, +\infty \end{matrix}}$$

$h'(x) = 0$

$\left(\frac{\cancel{2}x}{\cancel{2}\sqrt{\ }}\cancel{e^x} + \sqrt{\ }\,\cancel{e^x}\right)\underbrace{(x-3)(x-2)}_{x^2-5x+6} - (2x-5)\sqrt{\ }\,\cancel{e^x} = 0$

$(x + x^2 - 4)(x-3)(\cancel{x-2}) - (2x-5)(\cancel{x-2})(x+2) = 0$

$x^2 - 3x$

$x^3 - 3x^2$

$-4x + 12$

$-2x^2 - 4x$

$+5x + 10$

$x^3 - 4x^2 - 6x + 22$

	2	-5	-2	17
x	2	3	4	5

MAX $\quad$ MIN

$$\boxed{\begin{matrix} (2.21, -51.66) \\ (4.18, 93.27) \end{matrix}}$$

Stefano De Leo