

Note eser. 16/18 of 2019

TEST 5

$$D. 1 \quad f(x) = e^{x^2} \cdot \log(2 + \sin x)$$

$$\frac{d}{dy}(e^y) = e^y \quad z = f(x) = e^y$$

$$y = g(x) = x^2 \quad \log(2 + u)$$

$$u = h(x) = \sin x$$

$$\frac{dz}{dx} = \frac{dz}{dy} \cdot \frac{dy}{dx} = \frac{dz}{dy} \cdot \frac{d}{dx}(x^2 \cdot \log(2 + u))$$

$$\frac{d}{dx} \left[ \frac{d}{dx} x^2 \right] \log(2+n) + x^2 \cdot \frac{d}{dx} \log(2+n)$$

$$\frac{d}{dx} \left( 2x \log(2+\cos x) + x^2 \frac{1}{2+n} \cdot \frac{dn}{dx} \right)$$

$$2 \log(2+\cos x) + 2x \log(2+\cos x) + \frac{x^2}{2+\cos x} \cdot 2 \sin x$$

$$2(1+\cos x) \log(2+\cos x) + \frac{x^2}{2+\cos x} \cdot 2 \sin x$$

D2

L'Hôpital's rule

$$\frac{f(x) - f(0)}{x - 0} = \frac{x}{1 - e^{1/x}} \quad \frac{0}{0}$$

1

$$= \frac{1}{-e^{1/x}}$$

$$f'(0) = 0 \quad f'(0) = -1$$

$$y = \frac{1}{x}$$

$$1 - e^y$$

$$y \rightarrow \infty$$

$$y \rightarrow +\infty$$

$$1 \quad y \rightarrow 1 \quad y \rightarrow +\infty$$

0

$$\frac{1}{1 - e^{-x}}$$

$$\frac{1}{x} \dots$$

$$x \rightarrow 0^+$$
$$\rightarrow +\infty$$

$$x \rightarrow -\infty$$

$$x \rightarrow 0^-$$

$$\frac{1}{1 - e^x}$$

$$x \rightarrow +\infty$$
$$\rightarrow 0$$

$$x \rightarrow -\infty$$
$$\rightarrow 1$$

D 3

$$y = f'(x_0) (x - x_0) + f(x_0) = \tau(x)$$

ie grafico di  $\tau(x)$  è "la retta  
tangente nel punto  $(x_0, f(x_0))$   
al grafico di  $f$ "

$$f'(x) = \left[ \frac{1}{3} (\sqrt[3]{50(x-1)}) \right] \cdot (x-1)^{-2/3}$$

$$\frac{dx}{dx} = 1 \quad \int_{x=1}$$

$$\frac{1}{3}$$

$$\frac{1}{3}$$

$$(x-1)$$

$$+ f(x)$$

D.  $\hookrightarrow$  LASCRIATO PE (ASA)

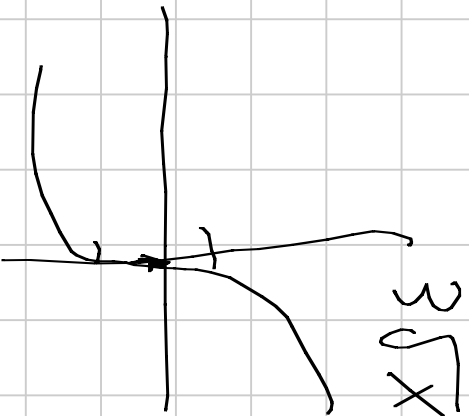
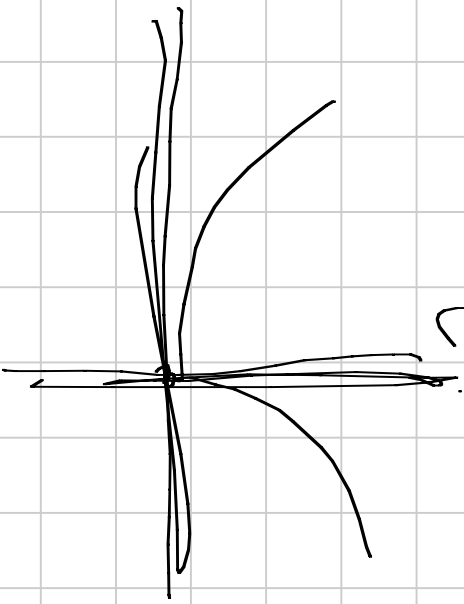
$$\text{Moltiplicando per } f(x) = \sqrt[3]{\frac{e}{x} + \frac{e}{x^3} - \frac{e}{x^4}} =$$

$$= \left( e y + e y^3 - e y^4 \right)^{1/3}$$

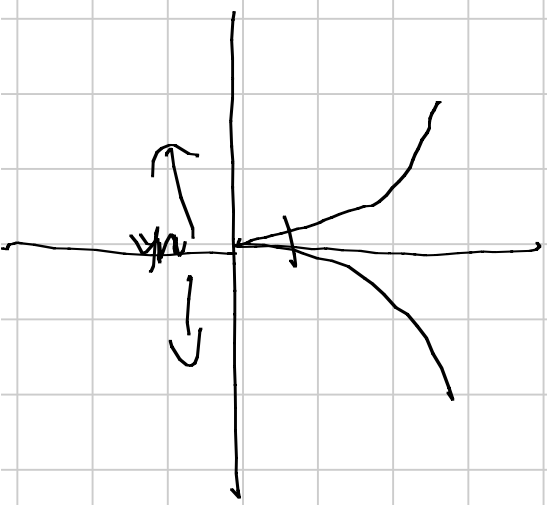
~~$y = \frac{1}{x}$~~

$$\frac{dF}{dx} \Big|_{x=1} = \frac{1}{3} (e^y + e^y - e^y)^{-2/3} \cdot \frac{d}{dy} (e^y + e^y - e^y) \cdot \frac{dy}{dx}$$

$$D5 \quad \left\{ \begin{array}{l} |x|^{3/2} \\ \ln|x| \end{array} \right.$$



$$\sqrt{|x|}$$





$$|X|^{-1/4} \log |X| \xrightarrow{X \rightarrow 0} 0$$

$$X \rightarrow 0$$

$$f(X) = 6 \left( |X|^{5/4} \right)$$

$$= |X| \cdot \left( |X|^{1/4} \right)$$

$$\frac{f'(X)}{X} = \frac{f'(X)}{|X|} \cdot \left( |X|^{1/4} \right)$$

$$3/2 - 2 = 1/4$$

$$6 \cdot 1/5 = 6/5$$

$$5/5 = 1$$

$$\rightarrow 0$$

$f(x)$

$x_0(x)$

$x \rightarrow 0$

swick

$\frac{f(x)}{x} \rightarrow 0$

$x \rightarrow 0$

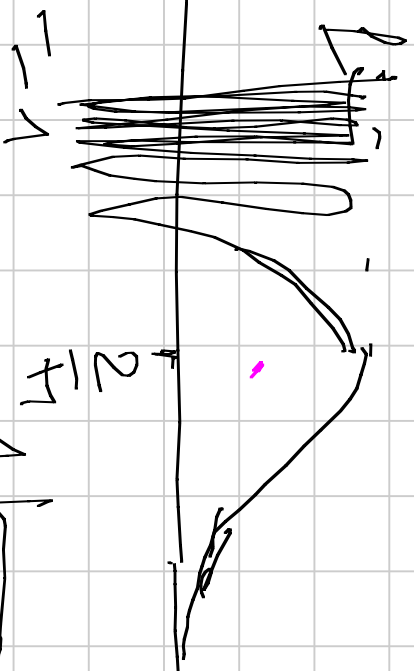
und

$\int f'(x) = 0$

,

$$D_0 f(x) = \begin{cases} |x|^a \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$$

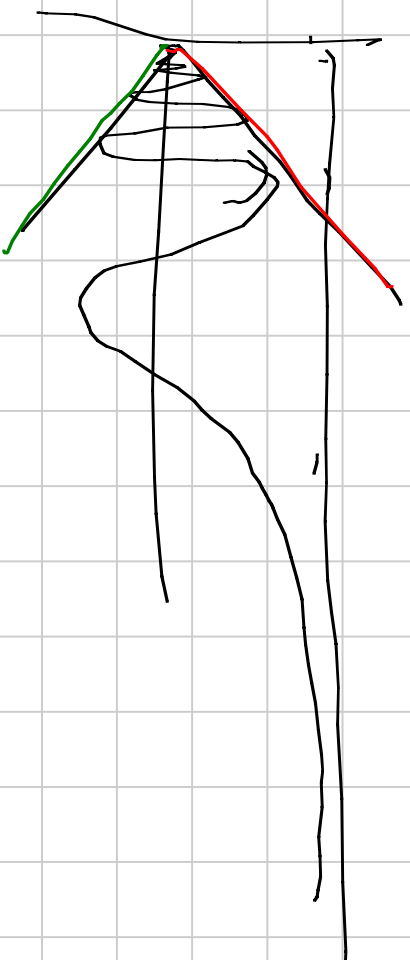
$$a = 0$$



0

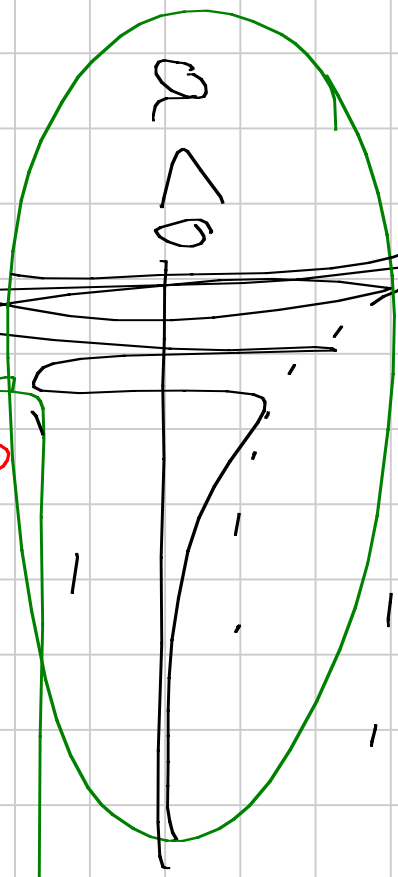
$$x = 0$$

$$a = 1 \quad |x| \sin \frac{1}{x}$$



$a = -1$

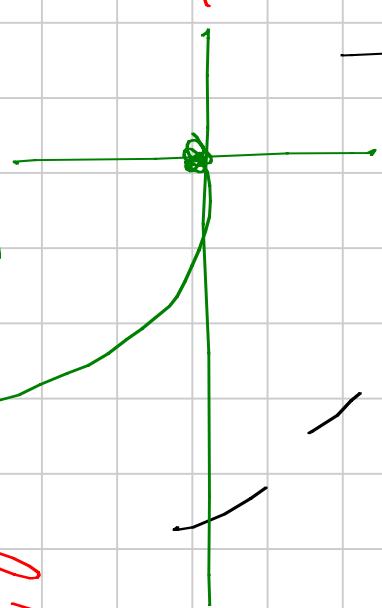
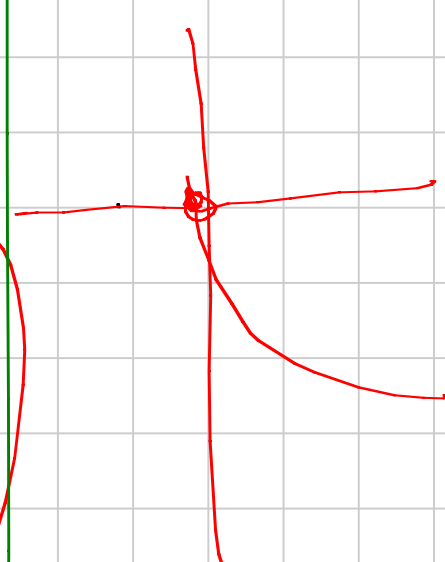
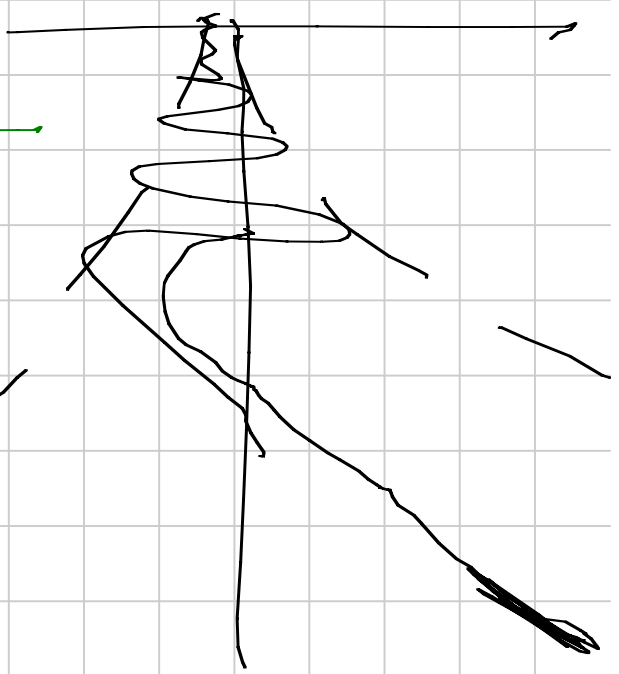
$0 < a < 1$



$$f(x) = m(x - x_0) + \delta(x - x_0)$$

$m = f'(x_0)$

$a > 1$



$$f(x) = \int |x|^a \sin \frac{1}{x}$$

$$x \neq 0$$

$$\ominus$$

$$x = 0$$

$$x > 0 \quad \frac{d}{dx} \left( x^a \sin \frac{1}{x} \right) = a x^{a-1} \sin \frac{1}{x} + x^a \left( \cos \frac{1}{x} \right) \left( -\frac{1}{x^2} \right)$$

$$\equiv \cancel{a} x^{a-1} \sin \frac{1}{x}$$

$$x^{a-2} \cos \frac{1}{x}$$

NOTA  
 $\text{for } a < 2$

(encu 2)

$$g\left(\frac{1}{2k\pi}\right) = f(2\pi)^{a-2}$$

$$g\left(\frac{1}{2k\pi + \pi}\right) = f(\pi)^{a-2}$$

$$\xrightarrow{+ \infty} \xrightarrow{- \infty}$$

$$x = 0$$

$$\lim_{x \rightarrow 0} 1$$

$$\lim_{x \rightarrow 0} \frac{f'(0)}{f(x) - f(0)} = \lim_{x \rightarrow 0} \frac{1}{x - 0} = \lim_{x \rightarrow 0} \frac{1}{x} = \infty$$

$$\lim_{x \rightarrow 0} x^{\alpha-1}$$

$$|x|^{\alpha-1}$$

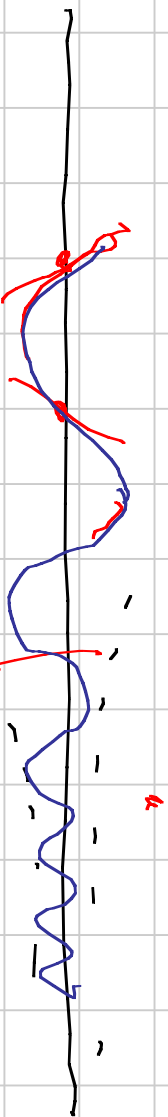
$$\lim_{x \rightarrow 0} \frac{1}{x}$$

$$\infty$$

$$\lim_{x \rightarrow 0} \frac{1}{x} = \infty$$

$$\infty$$

D  
F



$$\frac{1}{x} \approx \frac{100 \times 100 - 150 \times 100 \times 100 - 50 \times 100}{x^2}$$

$$f \rightarrow 0 \quad f'$$

$$\underline{-100 \times 97 \times 100 - 0(11)}$$

D 8

a) coso

D 9

$$x^2$$

$$\sqrt{x^2 - 2x + 1}$$

$$= 6(x)$$

$$x \rightarrow 0$$

$$\frac{f(x) - f(x_0)}{x - x_0}$$

$$= \frac{f(x)}{x - x_0} \rightarrow 1$$

$$\boxed{\begin{matrix} x^2 & | & x & - & 1 & | & 1 \\ \dots & & \dots & & \dots & & \dots \end{matrix}}$$

$$\left\{ \begin{matrix} x^2(x-1) & x > 1 \\ x^2(1-x) & x \leq 1 \end{matrix} \right.$$



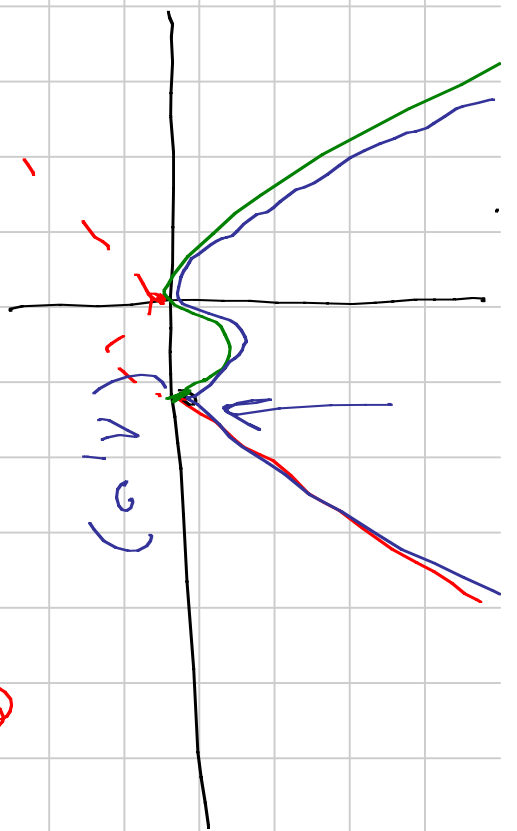
$$x^3 - x^2$$

$$x^2 - x^3$$

$$x^2(x-1)$$

$$x > 1$$

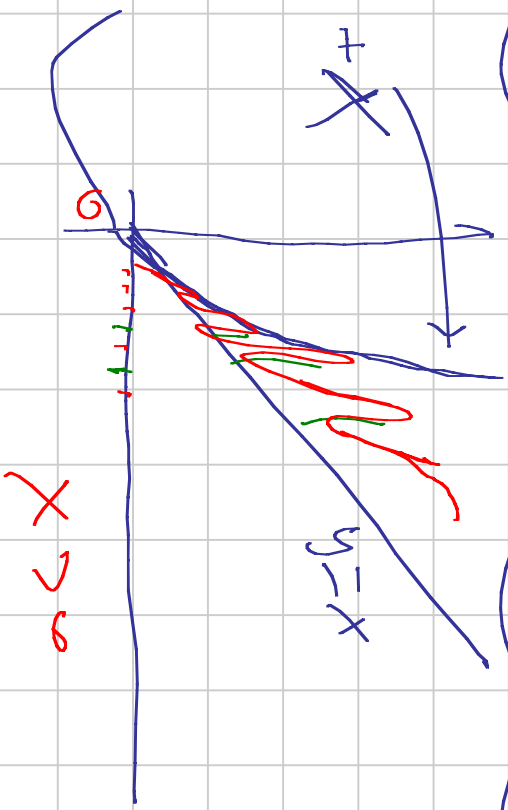
$$x \leq 1$$



②

$$x^2 + x$$

$$y = x$$



$$x > 0$$

$$1 \leq \frac{f(x)}{x}$$

$$\leq \frac{x^2 + x}{x}$$

||

||

x

x

$$x \leq 1$$

$$x > 1$$