calcolarne la derivata e dire per quali valori di x essa non esiste.

$$\left[x \neq \frac{\pi}{2}+2k\pi;\ y' = \frac{\cos x}{|\cos x|}\cdot\frac{1}{1-\operatorname{sen} x};\ x \neq \frac{\pi}{2}+k\pi\right]$$

Tangenti a curve di data equazione

Scrivere l'equazione della tangente al grafico di ciascuna delle seguenti curve nei punti la cui ascissa è indicata a fianco fra parentesi:

1. $y=4x^3$. $(x=-1)$ **2.** $y=5x^2+3x$. $(x=1)$

3. $y=3x^3$. $(x=2)$ **4.** $y=2x^2+2x-3$. $(x=1)$

5. $y=4x^2-5x+1$. $(x=-1)$ **6.** $y=x^2+\dfrac{1}{x}$. $(x=2)$

7. $y=\dfrac{x+2}{x}$. $(x=-1)$ **8.** $y=\sqrt{x-2}$. $(x=6)$

9. $y=\dfrac{2x-1}{3x+2}$. $\left(x=\dfrac{1}{2}\right)$ **10.** $y=\dfrac{2x-5}{3x-1}$. $(x=-3)$

11. $y=\sqrt{3x^2-2}$. $(x=-3)$ **12.** $y=\operatorname{sen} x+\cos x$. $\left(x=\dfrac{\pi}{2}\right)$

13. $y=\operatorname{sen} x-\cos x$. $(x=0)$ **14.** $y=x+\operatorname{sen} x$. $(x=0)$

15. $y=x-\cos x$. $(x=0)$ **16.** $y=e^x$. $(x=0)$

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17. $y=3\cos x-\operatorname{tg} x$. $(x=0)$

18. $y=2\cos^2 x-3x^2+9x-\operatorname{sen} x$. $(x=0)$

19. $y=\dfrac{\operatorname{sen}^2 x}{3\operatorname{sen} x-\cos x}$. $\left(x=\dfrac{\pi}{4}\right)$

20. $y=\dfrac{e^x \ln x}{x}$. $(x=1)$

21. $y=\operatorname{arc\,sen}\left(-\dfrac{x}{2}\right)+\operatorname{arc\,tg} x$. $(x=\sqrt{3})$

22. $y=\dfrac{2x+\operatorname{sen} x+\cos x}{x+\cos x}$. $(x=0)$

23. $y=e^{\sqrt{3}\operatorname{sen} x+\cos x+1}$. $(x=0)$

26. $y = \text{arc tg}\,\dfrac{\text{sen}\,x}{\sqrt{1+\cos^2 x}} + \ln\left(\cos x + \sqrt{1+\cos^2 x}\right).$ $\left[\dfrac{\cos x - \text{sen}\,x}{\sqrt{1+\cos^2 x}}\right]$

27. $y = \log\left(1 + \text{tg}\,\dfrac{x}{2}\right).$ $\left[\dfrac{1}{\text{sen}\,x + \cos x + 1}\right]$

28. $y = x\,\text{arc tg}\,x - \log\sqrt{1+x^2}.$ $[\text{arc tg}\,x]$

29. $y = \text{arc tg}\,\dfrac{\text{sen}\,x}{1+\cos x}.$ $\left[\dfrac{1}{2}\right]$

30. $y = \log\dfrac{x-1}{\sqrt{x^2+x+1}} - \sqrt{3}\,\text{arc tg}\,\dfrac{2x+1}{\sqrt{3}}.$ $\left[\dfrac{3}{x^3-1}\right]$

31. $y = \log\dfrac{\sqrt{1+x^2}}{x} - \dfrac{1}{2x^2}.$ $\left[\dfrac{1}{x^3(x^2+1)}\right]$

32. $y = e^x \log\cos\sqrt{x}.$ $\left[e^x\left\{\log\cos\sqrt{x} - \dfrac{1}{2\sqrt{x}}\,\text{tg}\,\sqrt{x}\right\}\right]$

33. $y = x\,\text{arc sen}\,\sqrt{x} - \dfrac{1}{2}\,\text{arc tg}\,\sqrt{\dfrac{x}{1-x}} + \dfrac{1}{2}\sqrt{x(1-x)}.$ $[\text{arc sen}\,\sqrt{x}]$

34. $y = \sqrt{1-e^{2\cos x}} + \text{arc sen}\,\sqrt{1-e^{2\cos x}}.$ $\left[\dfrac{\text{sen}\,x \cdot e^{\cos x}(e^{\cos x}+1)}{\sqrt{1-e^{2\cos x}}}\right]$

35. $y = \text{arc tg}\left(1 - \dfrac{4x}{x^2+2x-1}\right)$ $\left[\dfrac{2}{1+x^2}\right]$

36. $y = \text{arc tg}\,\dfrac{3\,\text{tg}\,2x+4}{3-4\,\text{tg}\,2x}.$ $[2]$

37. $y = \text{arc tg}\,\dfrac{3x-x^3}{1-3x^2}.$ $\left[\dfrac{3}{x^2+1}\right]$

38. $y = \text{arc tg}\,\dfrac{\text{sen}\,x}{\cos^2 x}.$ $\left[\dfrac{\cos x(2-\cos^2 x)}{\cos^4 x - \cos^2 x + 1}\right]$

39. $y = \text{arc tg}\,\dfrac{2}{\cos^2 2x}.$ $\left[\dfrac{4\,\text{sen}\,4x}{4+\cos^4 2x}\right]$

40. $y = \text{arc tg}\,\dfrac{1}{\sqrt{x^2-1}} + \sqrt{x^2-1}.$ $\left[\dfrac{\sqrt{x^2-1}}{x}\right]$

41. $y = \text{arc tg}\,(1+2\cos x) - \text{arc tg}\,\dfrac{\cos x}{1+\cos x}.$ $[0]$

$$\lim_{x\to 0} \frac{3x^2 - \log_4\left(1-\sin^3 4x\right)}{4\arcsin^2\left(x+2\,\mathrm{tg}\,5x\right)} = \frac{3}{484}$$

$$\lim_{x\to 0} \frac{3x^3+1-\cos 4x\sqrt{x}-x^6}{2\,\mathrm{arctg}\left(3^{x^2}-1\right)\cdot\log\left(1+\sin 6x\right)} = \frac{11}{12\log 3}$$

$$\lim_{x\to +\infty} \frac{5^{\frac{2}{x^2}}-1+\mathrm{tg}\frac{1}{3x^2}}{2\,\mathrm{arctg}\frac{9}{x^3}-\sin\frac{1}{x^2}} \quad \left(\text{porre } y := \frac{1}{x}\right) \quad = -\left(2\log 5+\frac{1}{3}\right)$$

$$\lim_{x\to 0} \frac{4-4\cos\frac{x}{2}-3\log\frac{x^2}{2}}{\mathrm{arctg}\left(2x\sin 5x\right)+2^{\mathrm{tg}\,x^3}-1} = -\frac{1}{10}$$

$$\lim_{x\to +\infty} \frac{\arcsin^3\frac{1}{\sqrt{x}}-\mathrm{tg}^2\left(\log_2\left(1+\frac{1}{x^3}\right)\right)}{\sqrt{x}\,\sin\frac{9}{x^2}} = \frac{1}{9}$$

$$\left(y := \frac{1}{\sqrt{x}} \Rightarrow \sqrt{x}=\frac{1}{y},\quad x=\frac{1}{y^2}\ \dots\right)$$

$$\frac{1}{x^3}=\left(\frac{1}{x}\right)^3=\left(y^2\right)^3\dots$$

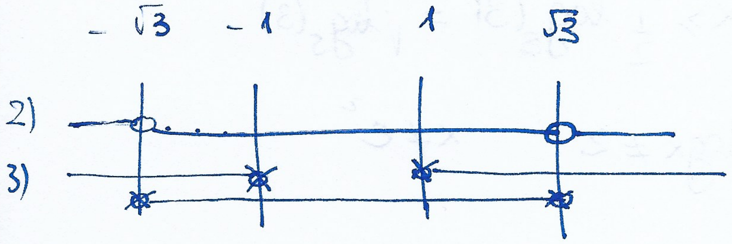
? D_f :

$$f(x) = \frac{\log(|x|+4)}{\arccos(x^2-2)} \qquad \begin{cases} 1.\ |x|+4>0 \\ 2.\ \arccos(x^2-2) \neq 0 \\ 3.\ -1 \leq x^2-2 \leq 1 \end{cases}$$

1) $|x| > -4 \quad \forall x \in \mathbb{R}$

2) $x^2-2 \neq 1 \iff x^2 \neq +3 \iff x \neq \pm\sqrt{3}$

3) $1 \leq x^2 \leq 3 \qquad \begin{cases} x^2-1 \geq 0 \iff x \leq -1,\ x \geq 1 \\ x^2-3 \leq 0 \iff -\sqrt{3} \leq x \leq \sqrt{3} \end{cases}$

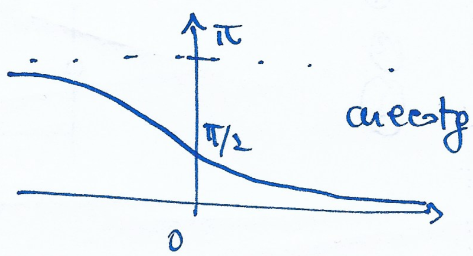


$D_f =]-\sqrt{3}, -1] \cup [1, +\sqrt{3}[$

$$f(x) = \frac{\sqrt{\log(3-|x|)}}{\text{arccotg}\left(2\sqrt{x^2-x+1} + x\right)}$$

$$\begin{cases} \log(3-|x|) \geq 0 & (1) \\ 3-|x|>0 & (2) \\ \text{arccotg}\left(2\sqrt{x^2-x+1} + x\right) \neq 0 & (3) \\ x^2-x+1 \geq 0 & (4) \end{cases}$$

Si ricordi che :



① $\Leftrightarrow$ $3-|x| \geq 1 \Leftrightarrow |x| \leq 2 \Leftrightarrow -2 \leq x \leq 2$

② $\Leftrightarrow$ $|x|<3 \Leftrightarrow -3<x<3$

③ $\forall x \in \mathbb{R}$

④ $\Delta = -3 < 0 \Rightarrow \forall x \in \mathbb{R}$

$D_f = [-2,2]$

$$f(x) = \operatorname{arctg}\left(\frac{\sqrt{5^{2x}-3}}{2-\log x}\right)$$

$$\begin{cases} 5^{2x}-3 \geq 0 & ① \\ 2-\log x \neq 0 & ② \\ x>0 & ③ \end{cases}$$

① $\Leftrightarrow 5^{2x} \geq 3 \Leftrightarrow 2x \geq \log_5(3) \Leftrightarrow$

$x \geq \frac{1}{2}\log_5(3) = \sqrt{\log_5(3)}$

② $\log x \neq 2$ $\quad x \neq e^2$

$$D_f = \left[\sqrt{\log_5 3}, +\infty\right[\setminus \{e^2\}$$

perché