Филип Филчев Фн: 0MI0600041

Контролно 1

2 a) $h(x) = (\operatorname{arctg} x)^{\sqrt{1+x^2}}$

$$h'(x) = (\operatorname{arctg} x)^{\sqrt{1+x^2}} \left(\frac{x \cdot \operatorname{arctg} x \cdot \ln \operatorname{arctg} x + 1}{\operatorname{arctg} x \cdot \sqrt{1+x^2}} \right)$$

в) $g(x) = \dfrac{e^x}{x^2 - 4x + 3}$ $\qquad g^{(11)}(2) = ?$

$(e^x)^{(11)} = e^x \to$ винаги е $\underline{\underline{e^x}}$

Лайбниц: $g(x) = e^x \cdot (x^2 - 4x + 3)^{-1}$

$\Rightarrow \binom{n}{0}(e^x)^{(11)} \cdot (x^2 - 4x + 3)^{-1} + \binom{n}{1} (e^x)^{(10)} \cdot (x^2 - 4x + 3)' + \binom{n}{2} (e^x)^{(9)} \cdot (x^2 - 4x + 3)''$

$(x^2 - 4x + 3)''' = 0$ и всяка следваща е 0

$\Rightarrow e^x \cdot (x^2 - 4x + 3)^{-1} + \underbrace{11 \cdot e^x \cdot (2x-4)^{-1}}_{0} + \frac{11 \cdot 10}{2} \cdot e^x \cdot 2^{-1} =$

$= -\dfrac{e^x}{} + 0 + \frac{\cancel{110}}{}\frac{55}{2} e^x = \cancel{109 e^x}$

$= \underline{\underline{\dfrac{53}{2}}} e^x$

Ogrn: OMI06000041

② б) $f(x) = \ln\left(\frac{(2-\sin x)^2}{\sin^2 x + 2\sin x + 4}\right) - 2\sqrt{3}\,\mathrm{arctg}\,\frac{\sin x + 1}{\sqrt{3}}$

$p(x) = \ln \frac{(2-\sin x)^2}{\sin^2 x + 2\sin x + 4}$ $\cancel{p'(x)} =$

$p'(x) = \frac{1}{\frac{(2-\sin x)^{\cancel{2}}}{\cancel{\sin^2 x + 2\sin x + 4}}} \cdot \left(\frac{-2\cos x \cdot \cancel{(2-\sin x)} \cdot (\sin^2 x + 2\sin x + 4) - \ldots}{(\sin^2 x + 2\sin x + 4)^{\cancel{2}}} \right) =$

$\rightarrow (2-\sin x)^2 (2\sin x \cos x + 2\cos x)$

$= \frac{-6\sin x \cdot \cos x - 12\cos x}{(2-\sin x)(\sin^2 x + 2\sin x + 4)} = \frac{6\cos x \cdot (\sin x + 2)}{\sin^3 x - 8}$

$h(x) = 2\sqrt{3} \cdot \mathrm{arctg}\,\frac{\sin x + 1}{\sqrt{3}}$

$h'(x) = \frac{2\sqrt{3} \cdot 1}{1 + \left(\frac{\sin x + 1}{\sqrt{3}}\right)^2} \cdot \left(\frac{\cos x \cdot \sqrt{3}}{3}\right) = \frac{2\sqrt{3} \cdot \cancel{3}}{(\sin x + 1)^2 + 3} \cdot \frac{\cos x \cdot \sqrt{3}}{\cancel{3}} =$

$= \frac{6\cos x}{\sin^2 x + 2\sin x + 4}$ $(\sin x - 2)$

$p'(x) - h'(x) = \frac{6\cos x(\sin x + 2)}{\sin^3 x - 8} - \frac{6\cos x}{\sin^2 + 2\sin x + 4} = \longrightarrow$

$$\longrightarrow \quad \frac{6\cos x(\sin x + 2 - \sin x + 2)}{\sin^3 x - 8} = \frac{24\cos x}{\sin^3 x - 8}$$

Jon: OMI06000H1.