

Производные тригонометрических функций

10 класс

N 17.9

$$b) f(x) = \sin x \cdot (\operatorname{ctg} x - 1)$$

$$(u \cdot v)' = u'v + v'u$$

$$u = \sin x, v = \operatorname{ctg} x - 1$$

$$f'(x) = (\sin x)' \cdot (\operatorname{ctg} x - 1) + (\operatorname{ctg} x - 1)' \cdot \sin x =$$

$$= \cos x \cdot (\operatorname{ctg} x - 1) + \left(-\frac{1}{\sin^2 x}\right) \cdot \sin x =$$

$$= \cos x \cdot \operatorname{ctg} x - \cos x - \frac{\sin x}{\sin^2 x} =$$

$$= \cos x \cdot \frac{\cos x}{\sin x} - \cos x - \frac{1}{\sin x} =$$

$$= \frac{\cos^2 x}{\sin x} - \cos x - \frac{1}{\sin x} =$$

$$= \frac{\cos^2 x - 1}{\sin x} - \cos x = -\frac{1 - \cos^2 x}{\sin x} - \cos x =$$

$$= -\frac{\sin^2 x}{\sin x} - \cos x = -\sin x - \cos x$$

N 17. 11

$$b) f(x) = \frac{\operatorname{tg} x}{3+x}, \quad \left(\frac{u}{v}\right)' = \frac{u'v - v'u}{v^2}$$

$$u = \operatorname{tg} x, \quad v = 3+x$$

$$\begin{aligned} f'(x) &= \frac{(\operatorname{tg} x)' \cdot (3+x) - (3+x)' \cdot \operatorname{tg} x}{(3+x)^2} = \frac{\cos x}{(3+x)^2} \\ &= \frac{\frac{1}{\cos^2 x} \cdot (3+x) - \operatorname{tg} x}{(3+x)^2} = \frac{\frac{3+x}{\cos^2 x} - \frac{\sin x}{\cos x}}{(3+x)^2} = \\ &= \frac{(3+x) - \cos x \cdot \sin x}{\cos^2 x (3+x)^2} = \\ &= \frac{3+x - \cos x \cdot \sin x}{\cos^2 x (3+x)^2} \end{aligned}$$

№ 17.6

Решить уравнение $f'(x) = 0$

$$\delta) f(x) = \cos 4x + 1$$

$$f'(x) = (\cos 4x)' + 1' = -\sin 4x \cdot (4x)' =$$
$$= -4 \sin 4x$$

$$-4 \sin 4x = 0, \quad | : (-4)$$

$$\sin 4x = 0,$$

$$4x = \pi n,$$

$$x = \frac{\pi}{4} n, \quad n \in \mathbb{Z}$$

4

N 17. 15

Вычислите значение производной в точке $x_0 = 0$

$$\delta) f(x) = \frac{4}{3} \operatorname{tg}(x^3 + x)$$

$$f'(x) = \frac{4}{3} \frac{1}{\cos^2(x^3 + x)} \cdot (x^3 + x)' =$$

$$= \frac{4}{3 \cos^2(x^3 + x)} \cdot (3x + 1) = \frac{4(3x + 1)}{3 \cos^2(x^3 + x)}$$

$$f'(0) = \frac{4(3 \cdot 0 + 1)}{3 \cos^2(0^3 + 0)} = \frac{4}{3 \cdot \cos^2 0} = \frac{4}{3}$$

Задание

* № 17.8, № 17.15 (а), 17.5 (г)