

Задание 12. Часть 1. Взять производные

I блок.

„Сумма функций“

1) $y = x^3 - 27x$, $y' = ?$

$y' = 3x^2 - 27$

2) $y = x^6 + 5x^5 - 2x^2$, $y' = ?$

$y' = 6x^5 + 25x^4 - 4x$

3) $y = 13x - \sqrt{x}$, $y' = ?$

$y' = 13 - \frac{1}{2\sqrt{x}}$ $y = \sqrt{x}$
 $y' = \frac{1}{2\sqrt{x}}$

4) $y = \frac{1}{x} + 2x^{-6} + 4$

$y' = -x^{-2} - 12x^{-7}$ $y = \frac{1}{x^5} = x^{-5}$
 $y' = -5x^{-6}$

5) $y = -\frac{3}{x^5} - \sin x = -3x^{-5} - \sin x$

$y' = 15x^{-6} - \cos x$

6) $y = \frac{10}{x^3} - \cos x = 10x^{-3} - \cos x$

$y' = -30x^{-4} + \sin x$

7) $y = 6x^3 + 3/\ln x$

$y' = 18x^2 + \frac{3}{x}$

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

II блок

„Произведение функций“

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

$y' = (x^3 - 1)'(2x^2 + 1) + (2x^2 + 1)'(x^3 - 1) =$
 $= 3x^2(2x^2 + 1) + 4x \cdot (x^3 - 1) \dots$

Пусть $f(x)$ - первая функция
 $g(x)$ - вторая функция

Если $y = f(x) \cdot g(x)$, то

$y' = f'(x) \cdot g(x) + g'(x) \cdot f(x)$

2) $y = (\frac{1}{x^2} + 4x)(x^3 + 3) = (x^{-2} + 4x)(x^3 + 3)$

$y' = (x^{-2} + 4x)'(x^3 + 3) + (x^3 + 3)'(x^{-2} + 4x) =$
 $y' = (-2x^{-3} + 4)(x^3 + 3) + (x^3 + 3)'(x^{-2} + 4x) \dots$

3) $y = \sqrt{x} \cdot (6x - 1)$

$y' = (\sqrt{x})'(6x - 1) + (\sqrt{x})(6x - 1)'$
 $y' = \frac{1}{2\sqrt{x}}(6x - 1) + 6\sqrt{x}$

4) $y = x^6 \cdot \cos x$

$y' = (x^6)' \cdot \cos x + (\cos x)' \cdot x^6 =$
 $= 6x^5 \cdot \cos x - \sin x \cdot x^6$

III блок.

„Дробная функция“

$y = \frac{f(x)}{g(x)}$

$y' = \frac{f'(x) \cdot g(x) - g'(x) \cdot f(x)}{g^2(x)}$

1) $y = \frac{3x^2 - 2x}{2x + 1}$

$y' = \frac{(3x^2 - 2x)'(2x + 1) - (2x + 1)'(3x^2 - 2x)}{(2x + 1)^2}$

2) $y = \frac{2 \cos x}{7x}$

$y' = \frac{(2 \cos x)'(7x) - (7x)'(2 \cos x)}{49x^2} =$
 $= \frac{-2 \sin x(7x) - 7 \cdot 2 \cos x}{49x^2}$

IV блок.

„Функция в функции“

$y = x^2$ $y' = 2x$

$y = \sqrt{x}$ $y' = \frac{1}{2\sqrt{x}}$

$y = \sin x$ $y' = \cos x$

$y = (2x + 1)^2$ $y' = 2(2x + 1) \cdot 2$

$y = \sqrt{2x + 1}$ $y' = \frac{1}{\sqrt{2x + 1}}(2x + 1)' =$
 $= \frac{2}{\sqrt{2x + 1}}$

$y = \sin(5x + 2)$ $y' = \cos(5x + 2) \cdot 5$
и т.д.

1) $y = (5 - 4x^2 + 9x)^3$

$y' = 3(5 - 4x^2 + 9x)^2 \cdot (-8x + 9) =$
 $= 3(5 - 4x^2 + 9x)^2 \cdot (-8x + 9)$

2) $y = \frac{3}{(3 - 4x)^4} = 3 \cdot (3 - 4x)^{-4}$

$y' = -12 \cdot (3 - 4x)^{-5} \cdot (-4) =$
 $= 48 \cdot (3 - 4x)^{-5}$

3) $y = 3 \cos(2x + 2)$

$y' = -3 \sin(2x + 2) \cdot (2x + 2)' =$
 $= -6 \sin(2x + 2)$