

Производная показательной
функции.

Найдите производную функции:

1) $3x^5 - 20x^3 - 54$

$$\begin{aligned} (3x^5 - 20x^3 - 54)' &= (3x^5)' - (20x^3)' - 54' = \\ &= 3(x^5)' - 20(x^3)' - 0 = 3 \cdot 5x^4 - 20 \cdot 3x^2 = \\ &= 15x^4 - 60x^2 \end{aligned}$$

ФОРМУЛЫ

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

$$(ku)' = k \cdot u'$$

$$C' = 0$$

$$(x^n)' = n \cdot x^{n-1}$$

2) $x^5 - 5x^3 - 20x$

$$\begin{aligned} (x^5 - 5x^3 - 20x)' &= (x^5)' - (5x^3)' - (20x)' = \\ &= 5x^4 - 5(x^3)' - 20(x)' = 5x^4 - 5 \cdot 3x^2 - 20 \cdot 1 = \\ &= 5x^4 - 15x^2 - 20 \end{aligned}$$

Найдите производную функции:

$$3) \quad y = \frac{x^3}{3} - 9x - 7$$

$$\left(\frac{x^3}{3} - 9x - 7 \right)' = \left(\frac{1}{3} x^3 \right)' - (9x)' - 7' =$$

$$= \frac{1}{3} (x^3)' - 9(x)' - 0 = \frac{1}{3} \cdot 3x^2 - 9 \cdot 1 =$$

$$= x^2 - 9$$

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

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

$$= -\frac{2}{3} \left(x^{\frac{3}{2}} \right)' + 3(x)' + 0 = -\frac{2}{3} \cdot \frac{3}{2} x^{\frac{3}{2}-1} + 3 =$$

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

ФОРМУЛЫ

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

$$(ku)' = k \cdot u'$$

$$C' = 0$$

$$(x^n)' = n \cdot x^{n-1}$$

Найдите производную функции:

$$5) \quad y = -\frac{2}{3}x\sqrt{x} + 3x + 1$$

Преобразуем функцию:

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

$$x\sqrt{x} = x^1 \cdot x^{\frac{1}{2}} = x^{1+\frac{1}{2}} = x^{\frac{3}{2}}$$

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

$$= -\frac{2}{3}\left(x^{\frac{3}{2}}\right)' + 3(x)' + 0 = -\frac{2}{3} \cdot \frac{3}{2}x^{\frac{3}{2}-1} + 3 =$$

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

ФОРМУЛЫ

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

$$(ku)' = k \cdot u'$$

$$C' = 0$$

$$(x^n)' = n \cdot x^{n-1}$$

Найдите производную функции:

$$6) \quad y = (x-2)^2(x-4) + 5$$

Преобразуем функцию:

$$\begin{aligned}(x^2 - 4x + 4)(x-4) + 5 &= x^3 - 4x^2 + 4x - \\ - 4x^2 + 16x - 16 + 5 &= x^3 - 8x^2 + 20x - 11\end{aligned}$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

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

$$(ku)' = k \cdot u'$$

$$\begin{aligned}(x^3 - 8x^2 + 20x - 11)' &= (x^3)' - (8x^2)' + (20x)' - 11' = \\ &= 3x^2 - 8(x^2)' + 20(x)' + 0 = 3x^2 - 8 \cdot 2x + 20 \cdot 1 = \\ &= 3x^2 - 16x + 20\end{aligned}$$

$$C' = 0$$

$$(x^n)' = n \cdot x^{n-1}$$

Найдите производную функции:

$$7) y = x + \frac{9}{x}$$

$$\begin{aligned} \left(x + \frac{9}{x}\right)' &= (x)' + \left(\frac{9}{x}\right)' = 1 + 9 \cdot \left(\frac{1}{x}\right)' = \\ &= 1 + 9 \cdot \left(-\frac{1}{x^2}\right) = 1 - \frac{9}{x^2} \end{aligned}$$

$$8) y = -\frac{x^2 + 1}{x}$$

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

$$\begin{aligned} \left(-\frac{x^2 + 1}{x}\right)' &= \left(-x - \frac{1}{x}\right)' = -(x)' - \left(\frac{1}{x}\right)' = \\ &= -1 - \left(-\frac{1}{x^2}\right) = -1 + \frac{1}{x^2} = \frac{-x^2 + 1}{x^2} \end{aligned}$$

ФОРМУЛЫ

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

$$(ku)' = k \cdot u'$$

$$\left(\frac{1}{x}\right)' = -\frac{1}{x^2}$$

$$(x^n)' = n \cdot x^{n-1}$$

ДРУГОЙ
СПОСОБ

Найдите производную функции:

$$9) \quad y = x + \frac{9}{x} \quad x + \frac{9}{x} = \frac{x^2 + 9}{x}$$

$$\begin{aligned} \left(\frac{x^2 + 9}{x} \right)' &= \frac{(x^2 + 9)' \cdot x - (x^2 + 9) \cdot x'}{x^2} = \\ &= \frac{2x \cdot x - (x^2 + 9) \cdot 1}{x^2} = \frac{2x^2 - x^2 - 9}{x^2} = \frac{x^2 - 9}{x^2} \end{aligned}$$

$$10) \quad y = -\frac{x^2 + 1}{x}$$

$$\begin{aligned} \left(-\frac{x^2 + 1}{x} \right)' &= -\left(\frac{x^2 + 1}{x} \right)' = -\frac{(x^2 + 1)' \cdot x - (x^2 + 1) \cdot x'}{x^2} = \\ &= -\frac{2x \cdot x - (x^2 + 1) \cdot 1}{x^2} = -\frac{2x^2 - x^2 - 1}{x^2} = -\frac{x^2 - 1}{x^2} = \frac{1 - x^2}{x^2} \end{aligned}$$

ФОРМУЛЫ

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

$$(ku)' = k \cdot u'$$

$$\left(\frac{u}{v} \right)' = \frac{u' \cdot v - u \cdot v'}{v^2}$$

$$(x^n)' = n \cdot x^{n-1}$$

$$C' = 0$$

[НАЗАД](#)