Производная показательной функции.

Найдите производную функции:

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

$$(3x^5 - 20x^3 - 54)' = (3x^5)' - (20x^3)' - 54' =$$
$$= 3(x^5)' - 20(x^3)' - 0 = 3 \cdot 5x^4 - 20 \cdot 3x^2 =$$
$$= 15x^4 - 60x^2$$

ФОРМУЛЫ

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

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

$$C' = 0$$

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

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

$$(x^5 - 5x^3 - 20x)' = (x^5)' - (5x^3)' - (20x)' =$$
$$= 5x^4 - 5(x^3)' - 20(x)' = 5x^4 - 5 \cdot 3x^2 - 20 \cdot 1 =$$
$$= 5x^4 - 15x^2 - 20$$

Найдите производную функции:

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

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

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

$$= x^2 - 9$$

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

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

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

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

ФОРМУЛЫ

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

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

$$C' = 0$$

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

Найдите производную функции:

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

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

ФОРМУЛЫ

Преобразуем функцию:

$$(x^2-4x+4)(x-4)+5=x^3-4x^2+4x-$$
$$-4x^2+16x-16+5=x^3-8x^2+20x-11$$

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

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

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

$$(x^3-8x^2+20x-11)'=(x^3)'-(8x^2)'+(20x)'-11'=$$
$$=3x^2-8(x^2)'+20(x)'+0=3x^2-8\cdot 2x+20\cdot 1=$$
$$=3x^2-16x+20$$

$$C'=0$$

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

Найдите производную функции:

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

$$\left(x+\frac{9}{x}\right)' = (x)' + \left(\frac{9}{x}\right)' = 1 + 9 \cdot \left(\frac{1}{x}\right)' =$$

$$= 1 + 9 \cdot \left(-\frac{1}{x^2}\right) = 1 - \frac{9}{x^2}$$

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

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

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

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

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

$$x + \frac{9}{x} = \frac{x^2 + 9}{x}$$

$$\left(\frac{x^2+9}{x}\right)' = \frac{\left(x^2+9\right)' \cdot x - \left(x^2+9\right) \cdot x'}{x^2} =$$

$$= \frac{2x \cdot x - \left(x^2+9\right) \cdot 1}{x^2} = \frac{2x^2 - x^2 - 9}{x^2} = \frac{x^2 - 9}{x^2}$$

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

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

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

ФОРМУЛЫ

$$\left(u + v\right)' = u' + v'$$

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

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

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

$$C' = 0$$

НАЗАД