

1. Найдите производные функции:

1. $y = x^5 - 4x^3 + 2x^2 - 7x$

$$y' = 5x^4 - 4 \cdot 3x^2 + 2 \cdot 2x - 7 = 5x^4 - 12x^2 + 4x - 7$$

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

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

$$y' = (1 - x^3)' \cdot (x^4 + 4x) + (1 - x^3) \cdot (x^4 + 4x)' = -3x^2 \cdot (x^4 + 4x) + (1 - x^3) \cdot (4x^3 + 4) = -3x^6 - 12x^3 + 4x^3 + 4 - 4x^3 - 4x^3 = 4 - 4x^3 - 3x^6 - 12x^3$$

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

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

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

4. $y = 3 \sin \alpha + 9 \operatorname{ctg} \alpha$

$(\sin x)' = \cos x$
 $(\operatorname{ctg} x)' = -\frac{1}{\sin^2 x}$

$y' = (3 \sin \alpha + 9 \operatorname{ctg} \alpha)' = 3 \cos \alpha - \frac{9}{\sin^2 \alpha}$

5. $y = 3x^2 - 6x$

$y' = 3 \cdot 2 \cdot x - 6 = 6x - 6 = 6(x - 1)$

6. $y = 2 \sin x$

$\Rightarrow y' = 2 \cos x$

7) $y = (2x^3 - 3 \sin 3x)$ степенная производная
 $y' = 6x^2 - 3 \cdot \cos 3x \cdot (3x)' = 6x^2 - 9 \cdot \cos 3x$

8) $y = (\operatorname{tg} 3x - 8)$ сложн.
 $y' = \frac{1}{\cos^2(3x)} \cdot (3x)' - 0 = \frac{3}{\cos^2 3x}$

9) $y = (3 - 2x)^5$ степенная
 $y' = 5 \cdot (3 - 2x)^{5-1} \cdot (3 - 2x)' = 5 \cdot (3 - 2x)^4 \cdot (-2) = -10(3 - 2x)^4$