ПРАВИЛА ВЫЧИСЛЕНИЯ ПРОИЗВОДНЫХ

ТАБЛИЦА ПРОИЗВОДНЫХ

$f(x)$	$f'(x)$
C (const)	0
kx+b	k
x^2	$2x$
x^3	$3x^2$
$\sqrt{x}$	$\dfrac{1}{2\sqrt{x}}$
x^n	nx^{n-1}
$\dfrac{1}{x}$	$-\dfrac{1}{x^2}$

ПРАВИЛА ВЫЧИСЛЕНИЯ ПРОИЗВОДНЫХ

$$(U+V)' = U' + V'$$

$$(UV)' = U'V + UV'$$

$$\left(\frac{U}{V}\right)' = \frac{U'V - UV'}{V^2}$$

$$(CU)' = CU',\ C - const$$

№1.

Найдите производные функций:

$а)\ f(x) = x^2 - \dfrac{1}{x}$

$б)\ f(x) = x^2 \cdot (2x - 7)$

$в)\ f(x) = \dfrac{x^2}{x^3 - 1}$

$г)\ f(x) = x^{-5}$

$д)\ f(x) = 3x^7 - \dfrac{5}{x^3}$

$$a)\, f(x) = x^2 - \frac{1}{x}$$

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

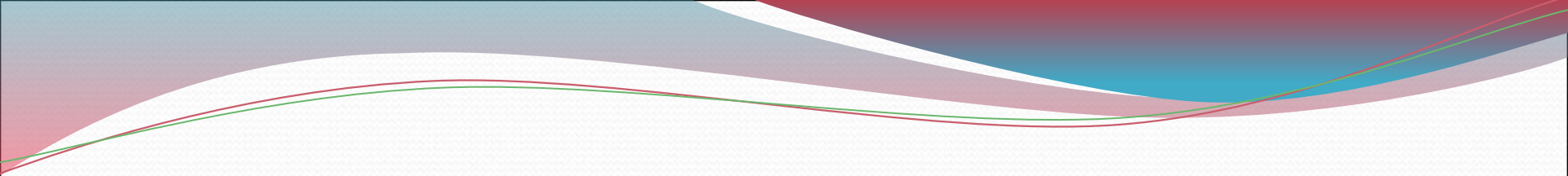$$= 2x - (-\frac{1}{x^2}) = 2x + \frac{1}{x^2}$$

$б)\, f(x) = x^2 \cdot (2x - 7)$

$f'(x) = (x^2)' \cdot (2x - 7) + (x^2) \cdot (2x - 7)' =$

$= 2x \cdot (2x - 7) + x^2 \cdot 2 = 4x^2 - 14x + 2x^2 =$

$= 6x^2 - 14x$

$$в)\,f(x) = \frac{x^2}{x^3 - 1}$$

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

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

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

$$г)\, f(x) = x^{-5}$$

$$f'(x) = (x^{-5})' = -5x^{-5-1} = -5x^{-6}$$

$$\partial)\, f(x) = 3x^7 - \frac{5}{x^3}$$

$$f'(x) = \left(3x^7 - \frac{5}{x^3}\right)' = (3x^7)' - (5x^{-3})' =$$

$$= 3 \cdot 7x^6 - 5 \cdot (-3x^{-3-1}) = 21x^6 + 15x^{-4} =$$

$$= 21x^6 + \frac{15}{x^4}$$

Найдите производные функций

а) $f(x) = x^2 + x^3;$

б) $f(x) = \dfrac{1}{x} + 5x - 2;$

в) $f(x) = x^2 + 3x - 1;$

г) $f(x) = x^3 + \sqrt{x}.$

$$a)\, f(x) = x^2 + x^3$$

$$f(x) = (x^2)' + (x^3)' = 2x + 3x^2$$

$$б)\, f(x) = \frac{1}{x} + 5x - 2$$

$$f'(x) = (\frac{1}{x})' + (5x)' - 2' = -\frac{1}{x^2} + 5$$

$$в) f(x) = x^2 + 3x - 1$$

$$f'(x) = 2x + 3$$

$$г) f(x) = x^3 + \sqrt{x}$$

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

№ 209 (б,г).

Найдите производные функций

б) $f(x) = \sqrt{x}\,(2x^2 - x)$;

г) $f(x) = (2x - 3)(1 - x^3)$.

$$б)\, f(x) = \sqrt{x}(2x^2 - x)$$

$$f'(x) = (\sqrt{x})'(2x^2 - x) + \sqrt{x}(2x^2 - x)' =$$

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

$$= \frac{2x^2 - x}{2\sqrt{x}} + 4x\sqrt{x} - \sqrt{x}$$

$$г) f(x) = (2x-3)(1-x^3)$$

$$f'(x) = (2x-3)'(1-x^3) + (2x-3)(1-x^3)' =$$

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

$$= 2 - 2x^3 - 6x^3 + 9x^2 = -8x^3 + 9x^2 + 2$$

№ 210 (а,б).

Найдите производные функций

а) $y = \dfrac{1 + 2x}{3 - 5x}$;

б) $y = \dfrac{x^2}{2x - 1}$;

$$a)\ f(x) = \frac{1+2x}{3-5x}$$

$$f'(x) = \frac{(1+2x)'(3-5x) - (1+2x)(3-5x)'}{(3-5x)^2} =$$

$$= \frac{2(3-5x) - (1+2x)(-5)}{(3-5x)^2} =$$

$$= \frac{6-10x+5+10x}{(3-5x)^2} = \frac{11}{(3-5x)^2}$$

$$\textbf{\textit{б}) } f(x) = \frac{x^2}{2x-1}$$

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

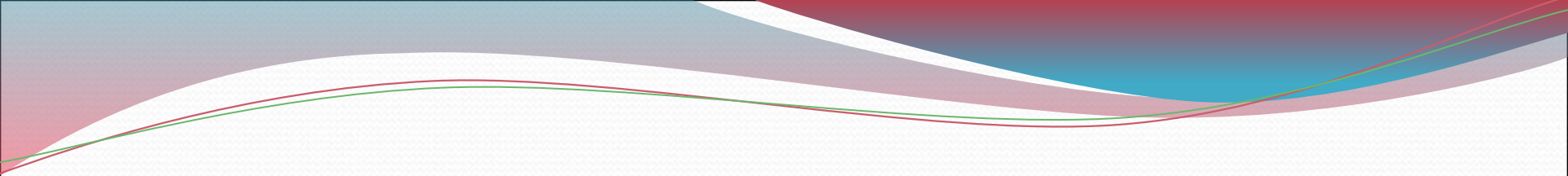$$= \frac{2x(2x-1) - x^2 \cdot 2}{(2x-1)^2} = \frac{4x^2 - 2x - 2x^2}{(2x-1)^2} =$$

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

№ 211 (а,г).

Найдите производные функций

а) $y = x^8 - 3x^4 - x + 5;$

г) $y = \dfrac{x^2}{2} + \dfrac{3}{x^3} + 1.$

$$a)\,f(x) = x^8 - 3x^4 - x + 5$$

$$f'(x) = 8x^7 - 3 \cdot 4x^3 - 1 = 8x^7 - 12x^3 - 1$$

$$г)\, f(x) = \frac{x^2}{2} + \frac{3}{x^3} + 1 = \frac{1}{2}x^2 + 3x^{-3} + 1$$

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

$$= x - 9x^{-4} = x - \frac{9}{x^4}$$

Домашнее задание:
№ 209 (а,в)
210 (в,г)
211 (б,в).