Урок 6, задача 1

$y = \frac{1}{x} + \frac{2}{x^2} - \frac{5}{x^3} + \sqrt{x} - \sqrt[3]{x} + \frac{3}{\sqrt{x}} \to$

$\to -\frac{5}{x^3} + \frac{2}{x^2} + \frac{1}{x} + \frac{3}{\sqrt{x}} + \sqrt{x} - x^{3/2} \to$

$\to \frac{d}{dx}\left(-\frac{5}{x^3} + \frac{2}{x^2} + \frac{1}{x} + \frac{3}{\sqrt{x}} + \sqrt{x} - x^{3/2}\right) \to$

$\to -5\left(\frac{d}{dx}\left(\frac{1}{x^3}\right)\right) + 2\left(\frac{d}{dx}\left(\frac{1}{x^2}\right)\right) + \frac{d}{dx}\left(\frac{1}{x}\right) + 3\left(\frac{d}{dx}\left(x^{-1/2}\right)\right) + \frac{d}{dx}\left(\sqrt{x}\right) - \frac{d}{dx}\left(x^{3/2}\right)$

$\to \frac{d}{dx}(x^n) = nx^{n-1}, \; n = -3 \to \frac{d}{dx}\left(\frac{1}{x^3}\right) = \frac{d}{dx}(x^{-3}) = -3x^{-4} \to$

$\to 2\left(\frac{d}{dx}\left(\frac{1}{x^2}\right)\right) + \frac{d}{dx}\left(\frac{1}{x}\right) + 3\left(\frac{d}{dx}\left(x^{-1/2}\right)\right) + \frac{d}{dx}\left(\sqrt{x}\right) - \frac{d}{dx}\left(x^{3/2}\right) - 5 - \frac{3}{x^4} \to$

$\to \frac{15}{x^4} + 2\left(\frac{d}{dx}\left(\frac{1}{x^2}\right)\right) + \frac{d}{dx}\left(\frac{1}{x}\right) + 3\left(\frac{d}{dx}\left(x^{-1/2}\right)\right) + \frac{d}{dx}\left(\sqrt{x}\right) - \frac{d}{dx}\left(x^{3/2}\right) \to$

$\to \frac{d}{dx}(x^n) = nx^{n-1}, \; n = -2; \; \frac{d}{dx}\left(\frac{1}{x^2}\right) = \frac{d}{dx}(x^{-2}) = -2x^{-3}$

$\to \frac{15}{x^4} + \frac{d}{dx}\left(\frac{1}{x}\right) + 3\left(\frac{d}{dx}\left(x^{-\frac{1}{2}}\right)\right) + \frac{d}{dx}\left(\sqrt{x}\right) - \frac{d}{dx}\left(x^{3/2}\right) + 2 - \frac{2}{x^3}$

$\to \frac{15}{x^4} - \frac{4}{x^3} + \frac{d}{dx}\left(\frac{1}{x}\right) + 3\left(\frac{d}{dx}\left(x^{-\frac{1}{2}}\right)\right) + \frac{d}{dx}\left(\sqrt{x}\right) - \frac{d}{dx}\left(x^{3/2}\right) \to$

$\to \frac{d}{dx}(x^n) = nx^{n-1}, \; n = -1; \; \frac{d}{dx}\left(\frac{1}{x}\right) = \frac{d}{dx}(x^{-1}) = -x^{-2}$

$\to \frac{15}{x^4} - \frac{4}{x^3} + 3\left(\frac{d}{dx}\left(\frac{1}{\sqrt{x}}\right)\right) + \frac{d}{dx}\left(\sqrt{x}\right) - \frac{d}{dx}\left(x^{3/2}\right) + \left(-\frac{1}{x^2}\right)$

$\to \frac{d}{dx}(x^n) = nx^{n-1}, \; n = -\frac{1}{2} \to \frac{d}{dx}\left(\frac{1}{\sqrt{x}}\right) = \frac{d}{dx}\left(x^{-\frac{1}{2}}\right) = -\frac{1}{2}x^{-3/2}$

$\to \frac{15}{x^4} - \frac{4}{x^3} - \frac{1}{x^2} + \frac{d}{dx}\left(\sqrt{x}\right) - \frac{d}{dx}\left(x^{3/2}\right) + 3 - \frac{1}{2x^{3/2}} \to$

$\to \frac{15}{x^4} - \frac{4}{x^3} - \frac{1}{x^2} - \frac{3}{2x^{3/2}} + \frac{d}{dx}\left(\sqrt{x}\right) - \frac{d}{dx}\left(x^{3/2}\right) \to$

$\to \frac{d}{dx}(x^n) = n \cdot x^{n-1}, \; n = \frac{1}{2}; \; \frac{d}{dx}\left(\sqrt{x}\right) = \frac{d}{dx}\left(x^{1/2}\right) = \frac{x^{-\frac{1}{2}}}{2} \to$

$\to \frac{15}{x^4} - \frac{4}{x^3} - \frac{1}{x^2} - \frac{3}{2x^{3/2}} - \frac{d}{dx}\left(x^{3/2}\right) + \frac{1}{2\sqrt{x}} \to$

$\to \frac{d}{dx}(x^n) = n \cdot x^{n-1}, \; n = \frac{3}{2}; \; \frac{d}{dx}\left(x^{\frac{3}{2}}\right) = \frac{3\sqrt{x}}{2} \to$

$\to \frac{15}{x^4} - \frac{4}{x^3} - \frac{1}{x^2} - \frac{3}{2x^{3/2}} + \frac{1}{2\sqrt{x}} - \frac{3\sqrt{x}}{2} \to$

$\to \frac{30 - 8x - 4x^2 - 3x^{5/2} + x^{7/2} - 3x^{9/2}}{2x^4}$ ответ

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