1 Найти производную функции:

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

Решение:

$$y'(x) = \left(\frac{1}{x} + \frac{2}{x^2} - \frac{5}{x^3} + \sqrt{x} - \sqrt[3]{x} + \frac{3}{\sqrt{x}}\right)' =$$

$$= \left(\frac{1}{x}\right)' + 2\left(\frac{1}{x^2}\right)' - 5\left(\frac{1}{x^3}\right)' + (\sqrt{x})' - (\sqrt[3]{x})' + 3\left(\frac{1}{\sqrt{x}}\right)' = (1)$$

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

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

$$\left(\frac{1}{x^3}\right)' = (x^{-3})' = (-3)x^{-3-1} = (-3)x^{-4} = -\frac{3}{x^4}$$

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

$$(\sqrt[3]{x})' = (x^{\frac{1}{3}})' = \frac{1}{3}x^{\frac{1}{3}-1} = \frac{1}{3}x^{-\frac{2}{3}} = \frac{1}{3\sqrt[3]{x^2}}$$

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

$$(1) = -\frac{1}{x^2} + 2\left(-\frac{2}{x^3}\right) - 5\left(-\frac{3}{x^4}\right) + \frac{1}{2\sqrt{x}} - \frac{1}{3\sqrt[3]{x^2}} + 3\left(-\frac{1}{2\sqrt{x^3}}\right) =$$

$$= -\frac{1}{x^2} - \frac{4}{x^3} + \frac{15}{x^4} + \frac{1}{2\sqrt{x}} - \frac{1}{3\sqrt[3]{x^2}} - \frac{3}{2\sqrt{x^3}}$$

Ответ:

$$y'(x) = -\frac{1}{x^2} - \frac{4}{x^3} + \frac{15}{x^4} + \frac{1}{2\sqrt{x}} - \frac{1}{3\sqrt[3]{x^2}} - \frac{3}{2\sqrt{x^3}}$$