Найти производную функции:

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

$$y = x^{-1} + 2 \cdot x^{-2} - 5 \cdot x^{-3} + x^{\frac{1}{2}} - x^{\frac{1}{3}} + 3 \cdot x^{-\frac{1}{2}}$$

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

b)

$$y = x \cdot \sqrt{1 + x^2}$$

$$y' = \sqrt{1 + x^2} + \frac{x}{2\sqrt{1 + x^2}} \cdot 2x = \sqrt{1 + x^2} + \frac{x^2}{\sqrt{1 + x^2}}$$

c)

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

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

d) *

$$y = \sqrt{x + \sqrt{x + \sqrt{x}}}$$

$$y' = \frac{\frac{1}{2\sqrt{x}} + 1}{2\sqrt{x + \sqrt{x + \sqrt{x}}}} + 1 = \frac{\frac{1}{2\sqrt{x}} + 1 + 2\sqrt{x + \sqrt{x}}}{2\sqrt{x + \sqrt{x + \sqrt{x}}}} = \frac{1 + 2\sqrt{x} + 4\sqrt{x} \cdot \sqrt{x + \sqrt{x}}}{2\sqrt{x}} = \frac{1 + 2\sqrt{x} + 4\sqrt{x} \cdot \sqrt{x + \sqrt{x}}}{2\sqrt{x + \sqrt{x + \sqrt{x}}} \cdot 2\sqrt{x + \sqrt{x}}} =$$

$$= \frac{1 + 2\sqrt{x} + 4\sqrt{x} \cdot \sqrt{x + \sqrt{x}}}{8\sqrt{x + \sqrt{x + \sqrt{x}}} \cdot \sqrt{x + \sqrt{x}} \cdot \sqrt{x}}$$

e)

$$y = \ln\left(x + \sqrt{x^2 + 1}\right)$$

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

f)

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

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

g) $y = \arcsin\left(\sin(x)\right)$

$$y' = \frac{\cos(x)}{\sqrt{1 - sin^2 x}} = \frac{\cos(x)}{\sqrt{cos^2 x}} = \frac{\cos(x)}{|\cos(x)|}$$