

2. Дифференцирование

Задание 1. Составить уравнение касательной и нормали в данной точке с абсциссой x_0 .

1.1.

$$y = \frac{4x - x^2}{4}, x_0 = 2$$

1.2.

$$y = \frac{3x - 2x^2}{3}, x_0 = 1$$

1.3.

$$y = 2x^2 + 3, x_0 = -1$$

1.4.

$$y = \frac{x^5 + 1}{x^4 + 1}, x_0 = 1$$

1.5.

$$y = x - x^3, x_0 = -1$$

1.6.

$$y = \frac{x^{16} + 9}{1 - 5x^2}, x_0 = 1$$

1.7.

$$y = \frac{x^5 + 1}{x^4 + 1}, x_0 = 1$$

1.8.

$$y = \frac{2x + 1}{x}, x_0 = 1$$

1.9.

$$y = \frac{1}{3x + 2}, x_0 = 2$$

1.10.

$$y = x + \sqrt{x^3}, x_0 = 1$$

1.11.

$$y = \frac{x^3 + 2}{x^3 - 2}, x_0 = 2$$

1.12.

$$y = \frac{x}{x^2 + 1}, x_0 = -2$$

1.13.

$$y = \frac{1 + 3x^2}{3 + x^2}, x_0 = 1$$

1.14.

$$y = \frac{1 + \sqrt{x}}{1 - \sqrt{x}}, x_0 = 4$$

1.15.

$$y = 3\sqrt[4]{x} - \sqrt{x}, x_0 = 1$$

1.16.

$$y = \frac{2x}{x^2 + 1}, x_0 = 1$$

1.17.

$$y = 2x^2 - 3x + 1, x_0 = 1$$

1.18.

$$y = \frac{-2(x^8 + 2)}{3(x^4 + 1)}, x_0 = 1$$

1.19.

$$y = \frac{x^2 - 3x + 6}{x^2}, x_0 = 3$$

1.20.

$$y = \frac{x^2 - 3x + 3}{3}, x_0 = 3$$

1.21.

$$y = \sqrt{x} - 3\sqrt{3}x, x_0 = 64$$

1.22.

$$y = 14\sqrt{x} - 15\sqrt{3}x, x_0 = 1$$

1.23.

$$y = \sqrt[3]{x^2} - 20, x_0 = -8$$

1.24.

$$y = 8\sqrt[4]{x} - 70, x_0 = 16$$

1.25.

$$y = 2x^2 + 3x - 1, x_0 = -2$$

1.26.

$$y = -2(\sqrt[3]{x} + 3\sqrt{x}), x_0 = 1$$

1.27.

$$y = 3(\sqrt[3]{x} - 2\sqrt{x}), x_0 = 1$$

1.28.

$$y = \frac{x^2 - 2x - 3}{4}, x_0 = 4$$

1.29.

$$y = 2x^2 + 3x + 1, x_0 = -2$$

1.30.

$$y = x^2 + 8\sqrt{x} - 32, x_0 = 4$$

Задание 2. Найти дифференциал функции dy

2.1.

$$y = \ln \left| \frac{x + \sqrt{x^2 + 1}}{2x} \right|$$

2.2.

$$y = \sqrt{\operatorname{ctg} x} - \sqrt{\operatorname{tg}^3 \frac{x}{3}}$$

2.3.

$$y = \operatorname{tg} \left(\arccos \sqrt{1 - 2x^2} \right)$$

2.4.

$$y = \ln \left| \frac{x + \sqrt{x^2 + 1}}{2x} \right|$$

2.5.

$$y = \sqrt{1 + 2x} - \ln(x + \sqrt{1 + 2x})$$

2.6.

$$y = e^x (\cos 2x + 2 \sin 2x)$$

2.7.

$$y = x^2 \operatorname{arctg} (\sqrt{x^2 - 1} - \sqrt{x^2 + 1})$$

2.8.

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

2.9.

$$y = \arccos \left(\frac{1}{\sqrt{1 + 2x^2}} \right), \quad x > 0$$

2.10.

$$y = \ln \operatorname{tg} \frac{x}{2} - \frac{x}{\sin x}$$

2.11.

$$y = x (\sin \ln x - \cos \ln x)$$

2.12.

$$y = x \ln |x + \sqrt{x^2 + 3}| - \sqrt{x^2 + 3}$$

2.13.

$$y = \operatorname{arctg} \left(\operatorname{tg} \frac{x}{2} + 1 \right)$$

2.14.

$$y = \operatorname{arctg} \sin x + \sin x \ln \cos x$$

2.15.

$$y = \sqrt[3]{\frac{x + 2}{x - 2}}$$

2.16.

$$y = \ln |\cos \sqrt{x}| + \sqrt{x} \operatorname{tg} \sqrt{x}$$

2.17.

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

2.18.

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

2.19.

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

2.20.

$$y = \ln x + \sqrt{1 + x^2} - \sqrt{1 + x^2} \operatorname{arctg} x$$

2.21.

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

2.22.

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

2.23.

$$y = \ln (e^x + \sqrt{e^{2x} + 1}) + \arcsin e^{-x}$$

2.24.

$$y = \sqrt{3 + x^2} - x \ln |x + \sqrt{3 + x^2}|$$

2.25.

$$y = \operatorname{tg} 2 \arccos \sqrt{1 - 2x^2}$$

2.26.

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

2.27.

$$y = e^x (\cos 2x + 2 \sin 2x)$$

2.28.

$$y = 2x + \ln \sin x + 2 \cos x$$

Задание 3. Вычислить приближенно с помощью дифференциала

3.1.

$$y = \sqrt[3]{x}, \quad x = 7,76$$

3.2.

$$y = \sqrt{4x-1}, \quad x = 2,56$$

3.3.

$$y = \sqrt[5]{x^2}, \quad x = 1,03$$

3.4.

$$y = x^{11}, \quad x = 0,998$$

3.5.

$$y = x^5, \quad x = 2,997$$

3.6.

$$y = \sqrt[3]{x}, \quad x = 1,21$$

3.7.

$$y = \sqrt[5]{x^2}, \quad x = 1,04$$

3.8.

$$y = \sqrt[3]{x}, \quad x = 8,24$$

3.24.

$$y = \sqrt[3]{x^3 + 7x}, \quad x = 1,012$$

3.25.

$$y = \frac{1}{\sqrt{2x^2 + x + 1}}, \quad x = 0,016$$

3.26.

$$y = \sqrt[3]{x^2 + 2x + 5}, \quad x = 0,97$$

2.29.

$$y = x \operatorname{arctg} x - \ln \sqrt{1+x^2}$$

2.30.

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

3.9.

$$y = x^{21}, \quad x = 0,0998$$

3.10.

$$y = x^4, \quad x = 3,998$$

3.11.

$$y = \sqrt[3]{x^2}, \quad x = 1,03$$

3.12.

$$y = x - x^3, \quad x = 8,36$$

3.13.

$$y = x - x^3, \quad x = 27,54$$

3.14.

$$y = \frac{1}{\sqrt{x}}, \quad x = 4,16$$

3.15.

$$y = x^7, \quad x = 2,002$$

3.16.

$$y = x^7, \quad x = 1,996$$

3.17.

$$y = \sqrt{4x-3}, \quad x = 1,78$$

3.18.

$$y = \sqrt[3]{x}, \quad x = 26,46$$

3.19.

$$y = \sqrt{x^3}, \quad x = 0,98$$

3.20.

$$y = x^6, \quad x = 2,01$$

3.21.

$$y = \frac{x + \sqrt{5-x^2}}{2}, \quad x = 0,08$$

3.22.

$$y = \frac{1}{\sqrt{2x+1}}, \quad x = 1,58$$

3.23.

$$y = \arcsin x, \quad x = 0,08$$

3.27.

$$y = \sqrt{x^2 + x + 3}, \quad x = 1,97$$

3.28.

$$y = \sqrt{1+x+\sin x}, \quad x = 0,01$$

3.29.

$$y = \sqrt[3]{3x + \cos x}, \quad x = 0,01$$

3.30.

$$y = \sqrt[4]{2x - \sin(\pi x/2)}, \quad x = 1,02$$

Задание 4. Найти производную

4.1.

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

4.2.

$$y = \frac{x^6 + 8x^3 - 128}{\sqrt{8-x^3}}$$

4.3.

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

4.4.

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

4.5.

$$y = \frac{x^4 - 8x^2}{2(x^2 - 4)}$$

4.6.

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

4.7.

$$y = \frac{2x^2 - x - 1}{3\sqrt{2+4x}}$$

4.8.

$$y = \frac{(2x^2 + 3)\sqrt{x^2 - 3}}{9x^3}$$

4.9.

$$y = \frac{(1+x^8)\sqrt{1+x^8}}{12x^{12}}$$

4.10.

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

4.11.

$$y = \frac{x^2}{2\sqrt{1-3x^4}}$$

4.12.

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

4.13.

$$y = \frac{3x + \sqrt{x}}{\sqrt{x^2+2}}$$

4.14.

$$y = 2\sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}$$

4.15.

$$y = \frac{(x^2-8)\sqrt{x^2-8}}{6x^3}$$

4.16.

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

4.17.

$$y = \frac{4+3x^3}{x^3\sqrt{(2+x^3)^2}}$$

4.18.

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

4.19.

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

4.20.

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

4.21.

$$y = \frac{x^6 + x^3 - 2}{\sqrt{1-x^3}}$$

4.22.

$$y = \frac{x+7}{6\sqrt{x^2+2x+7}}$$

4.23.

$$y = \frac{(x^2-2)\sqrt{4+x^2}}{24x^3}$$

4.24.

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

4.25.

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

4.26.

$$y = \frac{1}{(x+2)\sqrt{x^2+4x+5}}$$

4.27.

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

4.28.

$$y = \frac{(x+3)\sqrt{2x-1}}{2x+7}$$

4.29.

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

4.30.

$$y = \frac{(x^2-6)\sqrt{(4+x^2)^3}}{120x^5}$$

Задание 5. Найти производную

5.1.

$$y = \frac{x^5 + 7x^2 + 17}{\sqrt{16 - x^4}}$$

5.2.

$$y = \frac{(x+7)\sqrt{1-x^3}}{x^4}$$

5.3.

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

5.4.

$$y = \frac{x^5 - 3x^2}{5(x^2 - 9)}$$

5.5.

$$y = \frac{x^3 + 2x^2 - 9}{6\sqrt{1-8x}}$$

5.6.

$$y = \frac{(x^3 + 3)\sqrt{x+7}}{4x^4}$$

5.7.

$$y = \frac{(1-x^6)\sqrt{1-x^6}}{10x^{10}}$$

5.8.

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

5.9.

$$y = \frac{x^3}{3\sqrt{1+5x^6}}$$

5.10.

$$y = 4^4 \sqrt{\frac{1+\sqrt{x}}{1-\sqrt{x}}}$$

5.11.

$$y = \frac{(x^2+3)\sqrt{x^2+3}}{8x^4}$$

5.12.

$$y = \frac{5-2x^5}{3x^3\sqrt{(2+x^2)^4}}$$

5.13.

$$y = 3 \frac{\sqrt[4]{x^2-5x+1}}{x-4}$$

5.14.

$$y = \sqrt[5]{\frac{(1+x^{4/5})^{32}}{x^{3/4}}}$$

5.15.

$$y = 3 \sqrt{\frac{x+6}{(x+1)^7}}$$

5.16.

$$y = \frac{x^5 + x^2 + 3}{\sqrt{1-x^4}}$$

5.17.

$$y = \frac{x-17}{\sqrt{x^2+5x-17}}$$

5.18.

$$y = \frac{(x^2-3)\sqrt{9-x^2}}{12x^5}$$

5.19.

$$y = \frac{x^2\sqrt{x-11}}{x^2+x+5}$$

5.20.

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

5.21.

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

5.22.

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

5.23.

$$y = \frac{(x^2+3)\sqrt{2x+7}}{3x-1}$$

5.24.

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

5.25.

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

5.26.

$$y = \frac{3(2x^4 + 7x^3 - x + 1)}{5\sqrt{2+x}}$$

5.27.

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

5.28.

$$y = \frac{(4x-5)\sqrt{x^2-x+5}}{x^3}$$

5.29.

$$y = \frac{(x^2+5)\sqrt[3]{(4+x^3)^2}}{24x^4}$$

5.30.

$$y = \frac{7}{(x^3+2)\sqrt{x^2-5x+7}}$$

Задание 6. Найти производную

6.1.

$$y = \ln(1 + e^{6x})\sqrt{1 + e^{2x}}$$

6.2.

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

6.3.

$$y = \ln(1 + e^x) - \operatorname{arctg} e^{x/2}$$

6.4.

$$y = e^{\sqrt[3]{x}}(\sqrt[3]{x^5} - 5\sqrt[3]{x^4} + x)$$

6.5.

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

6.6.

$$y = \sqrt{\sin 5x} - \ln \frac{\sqrt{1 + e^{2x}} - 1}{\sqrt{1 + e^x}}$$

6.7.

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

6.8.

$$y = x + \frac{8}{1 + e^{x/4}}$$

6.9.

$$y = \frac{e^{2x}(2 - \sin 2x - \cos 2x)}{8x}$$

6.10.

$$y = \ln(e^x + \sqrt{e^{2x-1}}) - \arcsin e^{-x}$$

6.11.

$$y = \frac{1}{2} \operatorname{arctg} \frac{e^x - 3}{2}$$

6.12.

$$y = \operatorname{arctg} e^x - e^{-x}$$

6.13.

$$y = \frac{1}{\ln 4} \ln \frac{1 + 2^x}{1 - 2^x}$$

6.14.

$$y = 2\sqrt{e^x + 1} + \ln \frac{\sqrt{e^x + 1} - 1}{\sqrt{e^x + 1} + 1}$$

6.15.

$$y = \frac{e^{x^3}}{1 + x^3}$$

6.16.

$$y = \frac{2}{3} \sqrt{(\operatorname{arctg} e^x)^3}$$

6.17.

$$y = \frac{1}{m\sqrt{ab}} \operatorname{arctg} \left(e^{mx} \sqrt{\frac{a}{b}} \right)$$

6.18.

$$y = \frac{1}{2} \ln e^{2x} + 1 - 2 \operatorname{arctg} e^x$$

6.19.

$$y = 3e^{\sqrt[3]{x}}(\sqrt[3]{x^2} + 2\sqrt[3]{x} + 2)$$

6.20.

$$y = \ln(e^x + 1) + \frac{18e^{2x} + 27e^x + 11}{6(e^x + 1)^3}$$

6.21.

$$y = \ln \frac{\sqrt{1 + e^x + e^{2x}} - e^x - 1}{\sqrt{1 + e^x + e^{2x}} - e^x + 1}$$

6.22.

$$y = 2 \frac{\sqrt{2^x - 1} - \operatorname{arctg} \sqrt{2^x - 1}}{\ln 2}$$

6.23.

$$y = e^{\sin x} \left(x - \frac{1}{\cos x} \right)$$

6.24.

$$y = \frac{e^{\alpha x} (\alpha \sin \beta x - \beta \cos \beta x)}{\alpha^2 + \beta^2}$$

6.25.

$$y = \frac{e^x}{2} \left((x-1)^2 \cos x + (x-1)^2 \sin x \right)$$

6.26.

$$y = \frac{e^{\alpha x} (\beta \sin \beta x - \alpha \cos \beta x)}{\alpha^2 + \beta^2}$$

6.27.

$$y = e^{\alpha x} \left[\frac{1}{2a} + \frac{a \cos 2bx + 2b \sin 2bx}{2(a^2 + 4b^2)} \right]$$

6.28.

$$y = -\frac{e^{3x}}{3 \sin^3 x}$$

6.29.

$$y = x + \frac{1}{1+e^x} - \ln(1+e^x)$$

6.30.

$$y = \arcsin e^x - \sqrt{1-e^{2x}}$$

Задание 7. Найти производную**7.1.**

$$y = \ln(e^x + 17\sqrt{e^{2x}-1})$$

7.2.

$$y = \ln(1+e^{2x}) - (\operatorname{arctg} e^{x/2})^3$$

7.3.

$$y = 2 \operatorname{arctg} e^{x/4} + \ln^3(1+e^{x/4})$$

7.4.

$$y = \frac{1}{3} e^{-x^3} (x^6 + 3x^3 + 3)$$

7.5.

$$y = e^{\sqrt[4]{x}} (\sqrt[4]{x^3} - 7\sqrt[4]{x^5} + 5x)$$

7.6.

$$y = \frac{e^x}{e^{x/4} - 2} - x$$

7.7.

$$y = \frac{e^x (3 + \cos x - \sin x)}{4x}$$

7.8.

$$y = \arccos e^{-x} + \ln(e^{2x} + \sqrt{e^x - 1})$$

7.9.

$$y = \operatorname{arctg} \frac{e^{2x} + 7}{e^x}$$

7.10.

$$y = \ln(1 - \sqrt{1+e^x}) + e^x \arcsin e^{-x}$$

7.11.

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

7.12.

$$y = e^{-2x} + \operatorname{arctg} e^{-x}$$

7.13.

$$y = \frac{1}{\ln 16} \ln \frac{1-3^x}{1+3^x}$$

7.14.

$$y = \ln \frac{\sqrt{e^{2x}-1} + 1}{\sqrt{e^{2x}-1} - 1} - 2\sqrt{e^{2x}+1}$$

7.15.

$$y = \frac{1+x^3}{e^{x^3}}$$

7.16.

$$y = \frac{3}{4} \sqrt[3]{(\operatorname{arctg} e^x)^2}$$

7.17.

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

7.18.

$$y = \operatorname{arctg} e^{2x} + \frac{1}{3} \ln(2e^{3x}) + 17$$

7.19.

$$y = 4e^{\sqrt[4]{x}} \left(\sqrt[4]{x^3} - \sqrt[4]{x} + 3 \right)$$

7.20.

$$y = \frac{4(e^x - 1)^2}{9e^{2x} + 18e^x - 17} - \ln(e^x - 1)$$

7.21.

$$y = \ln \frac{e^x - 1 - \sqrt{1 - e^x + e^{2x}}}{e^x - 1 + \sqrt{1 - e^x + e^{2x}}}$$

7.22.

$$y = 3 \frac{\operatorname{arctg} \sqrt{3^x - 1} + \sqrt{3^x - 1}}{\ln 3}$$

7.23.

$$y = e^{\cos x} \left(\frac{1}{\sin x} - x \right)$$

7.24.

$$y = \frac{e^{\beta x} (\alpha \cos \beta x - \beta \sin \beta x)}{\alpha^2 + \beta^2}$$

7.25.

$$y = \frac{1}{m \sqrt{\frac{a}{b}}} \operatorname{arctg} (\sqrt{ab} \cdot e^{mx})$$

7.26.

$$y = \frac{e^{\beta x} (\alpha \cos \beta x + \beta \sin \beta x)}{\alpha^2 + \beta^2}$$

7.27.

$$y = \frac{4 \sin^4 x}{e^{4x}}$$

7.28.

$$y = e^{bx} \left[\frac{1}{2x} + \frac{\cos 2ax}{2(4a^2 + b^2)} \right]$$

7.29.

$$y = \ln(1 - e^x) - x + \frac{e^x}{1 + e^x}$$

7.30.

$$y = \frac{e^{2x}}{2} \left((x-1)^4 \sin^2 x + (x-1)^2 \sin x \right)$$

Задание 8. Найти производную

8.1.

$$y = \ln x + \sqrt{a^2 + x^2}$$

8.2.

$$y = \ln \cos \frac{2x+3}{2x+1}$$

8.3.

$$y = 2\sqrt{x} - 4 \ln(2 + \sqrt{x})$$

8.4.

$$y = \lg \ln \operatorname{ctg} x$$

8.5.

$$y = \ln \frac{x^2}{\sqrt{1-ax^4}}$$

8.6.

$$y = \ln \arccos \sqrt{1-e^{4x}}$$

8.7.

$$y = \ln(\sqrt{x} + \sqrt{x+1})$$

8.8.

$$y = \ln \frac{a^2 + x^2}{a^2 - x^2}$$

8.9.

$$y = \ln \arcsin \sqrt{1-e^{2x}}$$

8.10.

$$y = \ln^2 x + \cos x$$

8.11.

$$y = \ln \arccos \sqrt{1+e^{4x}}$$

8.12.

$$y = \ln^3(1 + \cos x)$$

8.13.

$$y = \ln bx + \sqrt{a^2 + b^2 x^2}$$

8.14.

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

8.15.

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

8.16.

$$y = \ln \operatorname{tg} \left(\frac{\pi}{4} + \frac{x}{2} \right)$$

8.17.

$$y = \ln \left(\arccos \frac{1}{\sqrt{x}} \right)$$

8.18.

$$y = \ln^4 \sqrt{\frac{1+2x}{1-2x}}$$

8.19.

$$y = \log_a \frac{1}{1-x^4}$$

8.20.

$$y = \ln^2(\sqrt{x} + \sqrt{x+a})$$

8.21.

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

8.22.

$$y = \ln \frac{\sqrt{5} + \operatorname{tg} \frac{x}{2}}{\sqrt{5} - \operatorname{tg} \frac{x}{2}}$$

8.23.

$$y = \ln \sin \frac{2x+4}{x+1}$$

8.24.

$$y = \ln \frac{\ln x}{\sin \frac{1}{x}}$$

8.25.

$$y = \log_{16} \log_5 \operatorname{tg} x$$

8.26.

$$y = \ln \ln \sin \left(1 + \frac{1}{x} \right)$$

8.27.

$$y = \log_4 \log_2 \operatorname{tg} x$$

8.28.

$$y = \ln \ln^3 \ln^5 x$$

8.29.

$$y = \frac{x(\cos \ln x + \sin \ln x)}{2}$$

8.30.

$$y = \ln(x + \sqrt{1 + \operatorname{tg}^2 x})$$

Задание 9. Найти производную

9.1.

$$y = \frac{2(\sin \ln x - \cos \ln x)}{x}$$

9.2.

$$y = \sqrt{9 + x^2} - \ln x^3$$

9.3.

$$y = \ln \sin \frac{x-1}{x+1}$$

9.4.

$$y = 2\sqrt{x} - 4 \ln(2 + \sqrt{x})$$

9.5.

$$y = \log_2 \ln \operatorname{tg} x$$

9.6.

$$y = \ln \frac{\sqrt{1-ax^4}}{x^2}$$

9.7.

$$y = \log_5 \frac{x}{1-x^4}$$

9.8.

$$y = \ln(\sqrt{x} - \sqrt{x+17})$$

9.9.

$$y = \ln \frac{b^2 - x^2}{b^2 + x^2}$$

9.10.

$$y = \ln \operatorname{arctg} \sqrt{1 + e^{3x}}$$

9.11.

$$y = \ln^3 x + \cos x^3$$

9.12.

$$y = \ln \arcsin \sqrt{1 - e^{2x}}$$

9.13.

$$y = \ln^5(1 + \sin x)$$

9.14.

$$y = \sqrt{a^2 x^2 + b^2} - \ln ax$$

9.15.

$$y = \ln \frac{1-x^3}{x^3}$$

9.16.

$$y = \ln \frac{\sqrt{x^3+1} - x\sqrt{3}}{\sqrt{x^3+1} + x\sqrt{3}}$$

9.17.

$$y = \ln \operatorname{ctg} \left(\frac{\pi}{2} + x \right)$$

9.18.

$$y = \ln \left(\arcsin \frac{1}{\sqrt{2x}} \right)$$

9.19.

$$y = \ln \sqrt[3]{\frac{1-3x}{1+3x}}$$

9.20.

$$y = \ln \arcsin \sqrt{1 + e^{2x}}$$

9.21.

$$y = \frac{1}{3} \ln \left(\frac{x + \sqrt{3}}{x - \sqrt{3}} \right) - x$$

9.22.

$$y = \ln \frac{\sqrt{7} + \operatorname{tg} \frac{x}{4}}{\sqrt{7} - \operatorname{tg} \frac{x}{4}}$$

9.23.

$$y = \ln \cos \frac{3x-6}{x-1}$$

9.24.

$$y = \ln \frac{\sin \frac{1}{x}}{\ln x}$$

9.25.

$$y = \log_{17} \log_4 \operatorname{ctg} x$$

9.26.

$$y = \ln \ln \cos \left(\frac{1}{x} - 1 \right)$$

9.27.

$$y = \log_6 \log_3 \operatorname{tg} 3x$$

9.28.

$$y = \ln^2 \ln^4 \ln^6 x$$

9.29.

$$y = \ln \left(x - \sqrt{1 + 9 \operatorname{ctg}^2 x} \right)$$

9.30.

$$y = \sqrt{x} \ln(\sqrt{x} + \sqrt{x+2})$$

Задание 10. Найти производную

10.1.

$$y = \sin \sqrt{3} + \frac{1}{3} \frac{\sin^2 3x}{\cos 6x}$$

10.2.

$$y = \frac{\sin \operatorname{tg} \left(\frac{1}{5} \right) \cdot \cos^2 16x}{32 \sin 32x}$$

10.3.

$$y = \cos \ln 2 - \frac{1}{3} \frac{\cos^2 3x}{\sin 6x}$$

10.4.

$$y = \frac{\operatorname{ctg} \sin \left(\frac{1}{3} \right) \cdot \sin^2 21x}{17 \sin 34x}$$

10.5.

$$y = \operatorname{tg} \lg \frac{1}{3} + \frac{1}{4} \frac{\sin^2 4x}{\cos 8x}$$

10.6.

$$y = \frac{\sqrt[5]{\operatorname{ctg} 2 \cos^2 18x}}{36 \sin 36x}$$

10.7.

$$y = \operatorname{ctg} \sqrt[3]{5} - \frac{1}{8} \frac{\cos^2 4x}{\sin 8x}$$

10.8.

$$y = \frac{\operatorname{tg} \ln 2 \cdot \sin^2 10x}{19 \cos 38x}$$

10.9.

$$y = \frac{\cos \sin 5 \cdot \sin^2 20x}{\sin 40x}$$

10.10.

$$y = \operatorname{ctg} \cos 5 - \frac{1}{40} \frac{\cos^2 20x}{\sin 40x}$$

10.11.

$$y = \frac{\sin \cos 3 \cdot \cos^2 21x}{4 \sin 4x}$$

10.12.

$$\sqrt{\operatorname{tg} 4} + \frac{\sin^2 21x}{21 \cos 42x}$$

10.13.

$$y = \frac{\cos \ln 7 \cdot \sin^2 7x}{7 \cos 14x}$$

10.14.

$$y = \cos \ln 13 - \frac{1}{44} \frac{\cos^2 20x}{\sin 44x}$$

10.15.

$$y = \cos \operatorname{ctg} 2 - \frac{1}{16} \frac{\cos^2 8x}{16 \cos^2 16x}$$

10.16.

$$y = \ln \cos \frac{1}{3} + \frac{\sin^2 23x}{23 \cos 46x}$$

10.17.

$$y = \operatorname{ctg} \cos 2 + \frac{1}{6} \frac{\sin^2 6x}{\cos 12x}$$

10.18.

$$y = \operatorname{ctg} \sin \frac{1}{13} - \frac{1}{48} \frac{\cos^2 24x}{\sin 48x}$$

10.19.

$$y = \sqrt[3]{\operatorname{ctg} 2} - \frac{1}{20} \frac{\cos^2 10x}{\sin 10x}$$

10.20.

$$y = \sin \ln \frac{1}{2} + \frac{\sin^2 25x}{25 \cos 50x}$$

10.21.

$$y = \frac{1}{3} \cos \operatorname{tg} 12 + \frac{1}{10} \frac{\sin^2 10x}{\cos 20x}$$

10.22.

$$y = \sqrt[3]{\cos \sqrt{2}} - \frac{1}{52} \frac{\cos^2 26x}{\sin 52x}$$

10.23.

$$y = \ln \sin \frac{1}{3} - \frac{1}{24} \frac{\cos^2 12x}{\sin 24x}$$

10.24.

$$y = \sqrt[7]{\operatorname{tg} \cos 2} + \frac{\sin^2 27x}{27 \cos 54x}$$

10.25.

$$y = 8 \sin \operatorname{ctg} 3 + \frac{1}{5} \frac{\sin^2 5x}{\cos 10x}$$

10.26.

$$y = \sin \sqrt[3]{\operatorname{tg} 2} - \frac{\cos^2 28x}{56 \sin 56x}$$

10.27.

$$y = \frac{\cos \operatorname{ctg} 3 \cdot \cos^2 14x}{28 \sin 28x}$$

10.28.

$$y = \cos^2 \sin 3 + \frac{\sin^2 29x}{29 \cos 58x}$$

10.29.

$$y = \frac{\cos \operatorname{tg} \left(\frac{1}{3} \right) \cdot \sin^2 15x}{15 \cos 30x}$$

10.30.

$$y = \sin^3 \cos 2 - \frac{\cos^2 30x}{60 \sin 60x}$$

Задание 11. Найти производную

11.1.

$$y = \sin \sqrt{2} + \frac{1}{2} \frac{\sin^2 2x}{\cos 4x}$$

11.2.

$$y = \frac{\cos \operatorname{tg} \left(\frac{1}{4} \right) \cdot \cos^2 6x}{33 \cos 33x}$$

11.3.

$$y = \sin \ln 3 - \frac{1}{9} \frac{\sin^3 3x}{\cos 9x}$$

11.4.

$$y = \frac{\operatorname{tg} \sin \left(\frac{1}{4} \right) \cdot \sin^2 12x}{15 \cos 30x}$$

11.5.

$$y = \operatorname{tg} \ln \frac{1}{3} + \frac{1}{6} \frac{\sin^2 3x}{\cos 6x}$$

11.6.

$$y = \frac{\sqrt[3]{\operatorname{tg} 7} \cos^2 11x}{26 \sin 13x}$$

11.7.

$$y = \frac{1}{9} \frac{\cos^3 3x}{\sin 6x} + \operatorname{tg} \sqrt[8]{5}$$

11.8.

$$y = \frac{\sin^3 11x \cdot \operatorname{tg} \ln 7}{14 \cos 14x}$$

11.9.

$$y = \frac{\cos \sin 15 \cdot \cos^2 10x}{\sin 20x}$$

11.10.

$$y = \frac{1}{60} \frac{\cos^2 30x}{\sin 60x} + \operatorname{tg} \cos 5$$

11.11.

$$y = \frac{\sin \cos 4 \cdot \cos^3 2x}{6 \sin 6x}$$

11.12.

$$\sqrt{\operatorname{ctg} 3} + \frac{\sin^2 2x}{16 \cos 4x}$$

11.13.

$$y = \operatorname{tg} \cos 5 \frac{\operatorname{tg} \cos 5 \cdot \sin^2 17x}{34 \cos 17x}$$

11.14.

$$y = \sin \ln 38 - \frac{1}{22} \frac{\cos^2 11x}{\sin 22x}$$

11.15.

$$y = \sin \operatorname{ctg} 12 - \frac{1}{4} \frac{\cos^3 x}{\cos^2 2x}$$

11.16.

$$y = \ln \cos \frac{1}{13} + \frac{\sin^2 13x}{26 \cos 26x}$$

11.17.

$$y = \operatorname{tg} \cos 21 + \frac{1}{6} \frac{\sin^3 6x}{\cos x}$$

11.18.

$$y = \frac{1}{8} \frac{\cos^2 4x}{\sin 8x} + \ln \operatorname{tg} \cos 5$$

11.19.

$$y = \sqrt[5]{\operatorname{ctg} 1} - \frac{1}{2} \frac{\cos^3 x}{\sin 2x}$$

11.20.

$$y = \sin \ln \frac{3}{2} - \frac{\sin^2 5x}{25 \cos 10x}$$

11.21.

$$y = \frac{1}{72} \cos \operatorname{tg} 72 + \frac{1}{15} \frac{\sin^2 15x}{\cos 30x}$$

11.22.

$$y = \frac{1}{4} \frac{\cos^3 x}{\sin 2x} + \sqrt[5]{\cos \sqrt{3}}$$

11.23.

$$y = \ln \sin \frac{1}{13} - \frac{1}{24} \frac{\sin^2 12x}{\cos 24x}$$

11.24.

$$y = \sqrt[7]{\operatorname{tg} \cos 1} + \frac{\sin^3 x}{6 \cos 2x}$$

11.25.

$$y = 3 \sin \operatorname{ctg} 13 + \frac{1}{15} \frac{\sin^2 15x}{\cos 10x}$$

11.26.

$$y = \sin \sqrt[3]{\operatorname{tg} 4} - \frac{\cos^2 28x}{28 \sin 56x}$$

11.27.

$$y = \frac{\sin \operatorname{ctg} 13 \cdot \cos^2 4x}{8 \sin 8x}$$

11.28.

$$y = \cos^2 \operatorname{tg} 3 + \frac{\sin^2 29x}{58 \cos 58x}$$

11.29.

$$y = \frac{\cos \operatorname{tg} \left(\frac{1}{7} \right) \cdot \sin^2 5x}{5 \cos 10x}$$

11.30.

$$y = \cos^3 \ln 2 - \frac{\sin^2 3x}{6 \cos 6x}$$

Задание 12. Найти производную**12.1.**

$$y = \arctg \frac{\operatorname{tg} x - \operatorname{ctg} x}{\sqrt{2}}$$

12.2.

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

12.3.

$$y = \sqrt{\frac{2}{3}} \arctg \frac{3x-1}{\sqrt{6x}}$$

12.4.

$$y = \arctg x + \frac{5}{6} \ln \frac{x^2+1}{x^2+4}$$

12.5.

$$y = \arcsin \frac{\sqrt{x}-2}{\sqrt{5x}}$$

12.6.

$$y = \frac{4+x^4}{x^3} \arctg \frac{x^2}{2} + \frac{4}{x}$$

12.7.

$$y = \arcsin \frac{x-2}{(x-1)\sqrt{2}}$$

12.8.

$$y = \frac{2\sqrt{1-x} \arcsin \sqrt{x}}{x} + \frac{2}{\sqrt{x}}$$

12.9.

$$y = \arccos \frac{x^2-4}{\sqrt{x^4+16}}$$

12.10.

$$y = \operatorname{arctg} \frac{\sqrt{1-x}}{1-\sqrt{x}}$$

12.11.

$$y = \frac{1}{4} \ln x - x + 1 - \frac{1}{2} \operatorname{arctg} x$$

12.12.

$$y = \sqrt{1-x^2} - x \arcsin \sqrt{1-x^2}$$

12.13.

$$y = x\sqrt{2-x^2} + \arcsin(2x-3)$$

12.14.

$$y = \sqrt{6x-x^2} + \arcsin \sqrt{\frac{x}{2}}$$

12.15.

$$y = \frac{(1+x) \operatorname{arctg} \sqrt{x} - \sqrt{x}}{x}$$

12.16.

$$y = 6 \arcsin \frac{\sqrt{x}}{2} - \frac{6+x}{2} \sqrt{x(4-x)}$$

12.17.

$$y = \frac{(1+x) \operatorname{arctg} \sqrt{x}}{x^2} + \frac{1}{3x\sqrt{x}}$$

12.18.

$$y = \sqrt{3} + \frac{1}{3} \operatorname{arctg} \sqrt{x} - \frac{8}{3} \operatorname{arctg} \frac{\sqrt{x}}{2}$$

12.19.

$$y = \frac{x^3}{3} \arccos x - \frac{2+x^2}{9} \sqrt{1-x^2}$$

12.20.

$$y = \frac{2x-5}{4} \sqrt{5x-4-x^2} + \frac{9}{4} \arcsin \sqrt{\frac{x-1}{3}}$$

12.21.

$$y = \frac{1}{2\sqrt{x}} + \frac{1+x}{2x} \operatorname{arctg} \sqrt{x}$$

12.22.

$$y = (2x^2 + 6x + 5) \operatorname{arctg} \frac{x+1}{x+2} - x$$

12.23.

$$y = \frac{3+x}{2} \sqrt{x(2-x)} + 3 \arccos \sqrt{\frac{x}{2}}$$

12.24.

$$y = \frac{x}{2\sqrt{1-4x^2}} \arcsin 2x + \frac{1}{8} \ln(1-4x^2)$$

12.25.

$$y = \frac{(x-4)\sqrt{8x-x^2-7}}{2} - 9 \arccos \sqrt{\frac{x-1}{6}}$$

12.26.

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

12.27.

$$y = \arcsin \sqrt{\frac{x}{x+1}} + \operatorname{arctg} \sqrt{x}$$

12.28.

$$y = (x + 2\sqrt{x} + 2) \operatorname{arctg} \frac{\sqrt{x}}{\sqrt{x}+2} - \sqrt{x}$$

12.29.

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

12.30.

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

Задание 13. Найти производную

13.1.

$$y = \operatorname{arctg} \frac{\operatorname{tg} x + \operatorname{ctg} x}{\sqrt{7}}$$

13.2.

$$y = \frac{1+x}{2} \sqrt{x^3(x-1)} + \operatorname{arctg} \frac{\sqrt{x}}{2}$$

13.3.

$$y = \operatorname{arctg} \frac{\sqrt{3x+7}}{\sqrt{x}}$$

13.4.

$$y = \frac{\operatorname{arctg} \sqrt{x} - (1+x^2)\sqrt{x}}{x^3}$$

13.5.

$$y = \arcsin \frac{\sqrt{1+x^3}}{x-1}$$

13.6.

$$y = \frac{1}{\sqrt{x}} - \frac{\arcsin \sqrt{x}}{x\sqrt{1-x}}$$

13.7.

$$y = \arcsin \frac{\sqrt{x^4+81}}{x^2-9}$$

13.8.

$$y = \sqrt{\frac{7}{8}} \operatorname{arctg} \frac{3\sqrt{x}-1}{6x}$$

13.9.

$$y = \frac{7}{9} \ln \frac{x^2-1}{x^2+4} - \operatorname{arctg} x$$

13.10.

$$y = \frac{1}{4} \operatorname{arctg} \sqrt{x} + \frac{1}{9} \ln x - x + 1$$

13.11.

$$y = x \arccos \sqrt{2-x^2} + \sqrt{2-x^2}$$

13.12.

$$y = \arccos \frac{(x-1)\sqrt{2}}{x-2}$$

13.13.

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

13.14.

$$y = \frac{2}{3} \arcsin \frac{\sqrt{x}}{2} - \sqrt{3} + \frac{1}{3} \arcsin \sqrt{x}$$

13.15.

$$y = \frac{3-x^2}{4} \sqrt{2-x^2} + \frac{x^4}{4} \arccos x$$

13.16.

$$y = \operatorname{arctg} \frac{1-\sqrt{x}}{\sqrt{1-x}}$$

13.17.

$$y = \frac{2x}{1+x} \operatorname{arctg} \sqrt{2x} + \frac{7}{\sqrt{x}}$$

13.18.

$$y = (x^2 + 7x - 3) \operatorname{arctg} \frac{x+3}{x-3} - x^2$$

13.19.

$$y = \arccos \sqrt{\frac{x}{6}} - \frac{3+x}{2} \sqrt{x(4-x)}$$

13.20.

$$y = \frac{5}{x} - \frac{5+x^5}{x^4} \operatorname{arctg} \frac{x^3}{3}$$

13.21.

$$y = \operatorname{arctg} \sqrt{\frac{x}{x+1}} + \arcsin \sqrt{x}$$

13.22.

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

13.23.

$$y = \ln(1 + \sqrt{x}) - \arcsin \frac{x}{1+x}$$

13.24.

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

13.25.

$$y = \arcsin \frac{x-1}{5} - \sqrt{2x^2 + x}$$

13.26.

$$y = \arcsin x - \frac{x+2}{3} \sqrt{x^2 - x}$$

13.27.

$$y = \arccos \sqrt{\frac{x-7}{5}} + \frac{\sqrt{x-5x^2}}{2}$$

13.28.

$$y = \frac{x^3}{3\sqrt{2}} - x \operatorname{arctg} \frac{x^2 - 1}{x^3}$$

13.29.

$$y = (x + 5\sqrt{x}) \arcsin \frac{\sqrt{x}}{\sqrt{x} + 2}$$

13.30.

$$y = \frac{\sqrt{1-4x^2}}{x} + \ln(1-8x^2)$$

Задание 14. Найти производную**14.1.**

$$y = -\frac{\sin x}{2\cos^2 x} - \frac{1}{\sin x} - \frac{3}{2} \operatorname{arctg} \sin x$$

14.2.

$$y = \frac{\sin x}{4\cos^4 x} + \frac{3\sin x}{8\cos^2 x} + \frac{3}{8} \operatorname{arctg} \sin x$$

14.3.

$$y = \frac{1}{8\sqrt{2}} \ln \frac{\sqrt{2} + \operatorname{tg} x}{\sqrt{2} - \operatorname{tg} x} - \frac{\operatorname{tg} x}{4(2 - \operatorname{tg}^2 x)}$$

14.4.

$$y = \sqrt[4]{\frac{1 + \operatorname{tg} x}{1 - \operatorname{tg} x}}$$

14.5.

$$y = \frac{\sin x}{1 + \cos x}$$

14.6.

$$y = \frac{\cos x}{\sqrt{\sin 2x}}$$

14.7.

$$y = \frac{1}{2} \ln \frac{1 + \sqrt{\operatorname{tg} x}}{1 - \sqrt{\operatorname{tg} x}} - \operatorname{arctg} \sqrt{\operatorname{tg} x}$$

14.8.

$$y = \frac{1}{2} \operatorname{tg} x + \frac{1}{4\sqrt{2}} \ln \frac{1 + \sqrt{2} \operatorname{tg} x}{1 - \sqrt{2} \operatorname{tg} x}$$

14.9.

$$y = \frac{1}{2a\sqrt{1+a^2}} \ln \frac{a + \sqrt{1+a^2} \operatorname{tg} x}{a - \sqrt{1+a^2} \operatorname{tg} x}$$

14.10.

$$y = \frac{3}{2} \ln \operatorname{tg} \frac{x}{2} + \cos x - \frac{\cos x}{2\sin^2 x}$$

14.11.

$$y = \frac{1}{18\sqrt{2}} \ln \frac{1 + \sqrt{2} \operatorname{ctg} x}{1 - \sqrt{2} \operatorname{ctg} x}$$

14.12.

$$y = -\frac{\cos x}{2\cos^4 x} + \frac{3}{2} \arcsin \operatorname{tg} x$$

14.13.

$$y = \frac{\sin x}{2 \cos^2 x} + \frac{1}{2} \operatorname{arctg} \sin x$$

14.14.

$$y = \frac{1}{\sqrt{8}} \arcsin \frac{3 + \cos x}{1 - 3 \cos x}$$

14.15.

$$y = \frac{1}{\sqrt{8}} \ln \frac{4 + \sqrt{8} \operatorname{tg} \frac{x}{2}}{4 - \sqrt{8} \operatorname{tg} \frac{x}{2}}$$

14.16.

$$y = \frac{1}{4} \ln \operatorname{tg} \frac{x}{2} + \frac{1}{4} \ln \frac{3 + \cos x}{\sin x}$$

14.17.

$$y = \frac{2}{\sin x} - \frac{\sin x}{2 \cos^2 x} + \operatorname{arctg} \sin x$$

14.18.

$$y = -\frac{1}{2} \ln \operatorname{tg} \frac{x}{2} - \frac{\cos x}{2 \sin^2 x}$$

14.19.

$$y = \frac{1}{2} \operatorname{arctg} \sin x - \frac{\sin x}{2 \cos^2 x}$$

14.20.

$$y = -\frac{1}{4} \arcsin \frac{5 + 3 \cos x}{5 - 3 \cos x}$$

14.21.

$$y = \frac{1}{2} \left(\frac{\sin x}{\cos^2 x} + \operatorname{arctg} \sin x \right)$$

14.22.

$$y = \frac{8}{3} \operatorname{ctg} 2x - \frac{1}{3 \cos x \sin^3 x}$$

14.23.

$$y = \frac{1 + 8 \cos^2 x \ln \cos x}{2 \cos^2 x}$$

14.24.

$$y = \frac{1}{6} \ln \frac{1 - \sin 2x}{2 + \sin 2x}$$

14.25.

$$y = -\frac{\cos x}{2 \sin^2 x} - \frac{1}{2} \ln \operatorname{tg} \frac{x}{2}$$

14.26.

$$y = \frac{1}{4\sqrt{5}} \ln \frac{2 + \sqrt{5} \operatorname{tg} x}{2 - \sqrt{5} \operatorname{tg} x}$$

14.27.

$$y = \frac{\sin 3x}{\sqrt{\cos 6x}}$$

14.28.

$$y = \frac{1 - 8 \cos^2 x}{4 \cos^4 x}$$

14.29.

$$y = \operatorname{arctg} \frac{\sqrt{\sin 2x}}{\cos x - \sin x}$$

14.30.

$$y = -\frac{12 \sin^2 x + 1}{3 \sin^3 x}$$

Задание 15. Найти производную

15.1.

$$y = \frac{1}{\sqrt{3}} \ln \frac{3 - \sqrt{2} \operatorname{tg} x}{3 + \sqrt{2} \operatorname{tg} x}$$

15.2.

$$y = -\frac{3 \cos^3 x}{12 \cos^2 x + 1}$$

15.3.

$$y = \frac{5}{4} \operatorname{arctg} \cos x - \frac{\sin x}{7 \cos^4 x} + \frac{3 \sin x}{8 \cos^2 x}$$

15.4.

$$y = \arcsin \operatorname{ctg} x - \frac{\cos x}{2 \cos^4 x}$$

15.5.

$$y = \operatorname{arctg} \sqrt{\operatorname{tg} x} - \frac{1}{3} \ln \frac{1 - \sqrt{\operatorname{ctg} x}}{1 + \sqrt{\operatorname{ctg} x}}$$

15.6.

$$y = \frac{1}{\sqrt{3}} \operatorname{arctg} \frac{3 + \sin x}{1 - 3 \sin x}$$

15.7.

$$y = \frac{(2 - \operatorname{tg}^2 x)}{4 \operatorname{tg} x} - \frac{1}{3\sqrt{3}} \ln \frac{\sqrt{3} + \operatorname{tg} x}{\sqrt{3} - \operatorname{tg} x}$$

15.8.

$$y = \frac{1}{\sqrt{18}} \ln \frac{3 - \sqrt{2} \operatorname{tg} \frac{x}{2}}{3 + \sqrt{2} \operatorname{tg} \frac{x}{2}}$$

15.9.

$$y = \frac{1}{3\sqrt{3}} \ln \frac{1 + \sqrt{2} \operatorname{ctg} x}{1 - \sqrt{2} \operatorname{ctg} x} - \frac{1}{3} \operatorname{tg} x$$

15.10.

$$y = \frac{1}{8} \ln \frac{2 + \cos x}{\sin x} - \frac{1}{8} \ln \operatorname{tg} \frac{x}{4}$$

15.11.

$$y = \frac{\sin^2 x}{2 \cos x} - \frac{1}{3} \ln \operatorname{tg} \frac{x}{3}$$

15.12.

$$y = \frac{1}{3} \arcsin \frac{3 + 2 \cos x}{3 - 2 \cos x}$$

15.13.

$$y = \frac{\sqrt{1 + a^2}}{2a} \ln \frac{a + \sqrt{1 + a^2} \operatorname{ctg} x}{a - \sqrt{1 + a^2} \operatorname{ctg} x}$$

15.14.

$$y = \frac{1 - 6 \sin^2 x}{3 \sin^4 x}$$

15.15.

$$y = \frac{1}{4\sqrt{3}} \ln \frac{1 + \sqrt{3} \operatorname{tg} x}{1 - \sqrt{3} \operatorname{tg} x}$$

15.16.

$$y = \frac{\cos^2 x}{2 \sin x} + \frac{5}{2} \operatorname{arctg} \sin x - \frac{1}{2 \cos^4 x}$$

15.17.

$$y = \operatorname{arctg} \frac{\cos x - \sin x}{\sqrt{\sin 2x}}$$

15.18.

$$y = \frac{1}{\cos^2 x \sin^3 x} + \frac{2}{3} \operatorname{tg} 2x$$

15.19.

$$y = \frac{1}{7} \ln \frac{1 - \cos 3x}{2 + \cos 3x}$$

15.20.

$$y = \frac{\sin x}{6 \cos^2 x} - \operatorname{arctg} \sin x$$

15.21.

$$y = \sqrt[6]{\frac{1 - \operatorname{tg} x}{1 + \operatorname{tg} x}}$$

15.22.

$$y = \cos x - \frac{\cos x}{\sin^2 x} - \ln \operatorname{tg} \frac{\sqrt{x}}{2}$$

15.23.

$$y = \frac{1 + \cos x}{\sin^3 x}$$

15.24.

$$y = \frac{1}{\sin x} - \frac{3}{2} \operatorname{arctg} \cos x - \frac{\sin^2 x}{2 \cos x}$$

15.25.

$$y = \frac{\cos 3x}{\sqrt{\sin 3x}}$$

15.26.

$$y = \operatorname{arctg} \sin \sqrt{x} - \frac{\sin x}{2 \cos^2 x}$$

15.27.

$$y = \frac{\cos 4x}{\sqrt{\sin 8x}}$$

15.28.

$$y = \frac{1}{4} \left(\operatorname{arctg} \cos x + \frac{\sin x}{\cos^2 x} \right)$$

15.29.

$$y = \frac{2 \cos^2 x}{1 + 8 \cos^2 x \ln \cos x}$$

15.30.

$$y = \ln \operatorname{tg} \frac{x}{2} - \frac{\cos^3 x}{2 \sin^2 x}$$

Задание 16. Найти производную**16.1.**

$$y = (x^4 + 5)^{\operatorname{ctg} x}$$

16.2.

$$y = (\sin \sqrt{x})^{\ln \sin \sqrt{x}}$$

16.3.

$$y = (\sin x)^{5x/2}$$

16.4.

$$y = (\sin x)^{5e^x}$$

16.5.

$$y = (x^2 + 1)^{\cos x}$$

16.6.

$$y = (\arcsin x)^{e^x}$$

16.7.

$$y = 19^{x^{19}} x^{19}$$

16.8.

$$y = (\ln x)^{3x}$$

16.9.

$$y = x^{3^x} 2^x$$

16.10.

$$y = x^{\arcsin x}$$

16.11.

$$y = (\sin \sqrt{x})^{e^{1/x}}$$

16.12.

$$y = (\operatorname{ctg} 3x)^{2e^x}$$

16.13.

$$y = x^{e^{\operatorname{ctg} x}}$$

16.14.

$$y = x^{e^{\operatorname{tg} x}}$$

16.15.

$$y = (x^8 + 4)^{\operatorname{ctg} x}$$

16.16.

$$y = (\operatorname{tg} x)^{4e^x}$$

16.17.

$$y = x^{2^x} 5^x$$

16.18.

$$y = (\cos 5x)^{e^x}$$

16.19.

$$y = x^{e^{\sin x}}$$

16.20.

$$y = x (\sin x)^{8 \ln(x \sin x)}$$

16.21.

$$y = (\operatorname{arctg} x)^{(1/2) \ln \operatorname{arctg} x}$$

16.22.

$$y = (\operatorname{tg} x)^{\ln \operatorname{tg}(x/4)}$$

16.23.

$$y = (x-5)^{\cos x}$$

16.24.

$$y = x^{e^{\operatorname{arctg} x}}$$

16.25.

$$y = (x^3 + 4)^{\operatorname{tg} x}$$

16.26.

$$y = x^{e^{\cos 2x}}$$

16.27.

$$y = x^{\sin x^3}$$

16.28.

$$y = x^{29^x} 29^x$$

16.29.

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

16.30.

$$y = (\cos 2x)^{\ln \cos 2x}$$

Задание 17. Найти производную

17.1.

$$y = (x^5 - 4)^{\operatorname{tg} x}$$

17.2.

$$y = (\cos \sqrt{x})^{\ln \cos \sqrt{x}}$$

17.3.

$$y = (\sin x)^{5x^2}$$

17.4.

$$y = (\operatorname{tg} x)^{7e^x}$$

17.5.

$$y = (x^3 - 6)^{\sin x}$$

17.6.

$$y = (\operatorname{arctg} x)^{e^{2x}}$$

17.7.

$$y = 17^{x^{17}} x^{17}$$

17.8.

$$y = (\ln 3x)^x$$

17.9.

$$y = 3^x x^{2^x}$$

17.10.

$$y = x^{\operatorname{arctg} x}$$

17.11.

$$y = (\cos \sqrt{x})^{e^{2/x}}$$

17.12.

$$y = (\operatorname{tg} x)^{2e^{3x}}$$

17.13.

$$y = x^{e^{\operatorname{tg} 2x}}$$

17.14.

$$y = x^{e^{\operatorname{ctg} x}}$$

17.15.

$$y = (x^7 - 5)^{\operatorname{tg} x}$$

17.16.

$$y = (\operatorname{ctg} x)^{e^{2x}}$$

17.17.

$$y = 4^x x^{3^x}$$

17.18.

$$y = (\sin x)^{e^{2x}}$$

17.19.

$$y = x^{e^{\sin x}}$$

17.20.

$$y = (\sin 3x)^{\ln(x \sin x)}$$

17.21.

$$y = (\operatorname{ctg} x)^{\ln \operatorname{ctg}(2x)}$$

17.22.

$$y = (x^3 - 5)^{\sin x}$$

17.23.

$$y = x^{e^{\arcsin x}}$$

17.24.

$$y = (x^4 - 5)^{\operatorname{ctg} x}$$

17.25.

$$y = x^{e^{\sin 3x}}$$

17.26.

$$y = x^{\cos x^4}$$

17.27.

$$y = 17^x x^{17^x}$$

17.28.

$$y = (x^3 + 5)^{\cos x}$$

17.29.

$$y = (\sin 3x)^{\ln \sin 3x}$$

17.30.

$$y = (\arcsin x)^{5 \ln \arcsin x}$$

Задание 18. Найти производную

18.1.

$$y = (\cos 2x)^{\ln \cos 2x/4} \quad y = \frac{1}{24}(x^2 + 8)\sqrt{x^2 - 4} + \frac{x^4}{16} \arcsin \frac{2}{x}$$

18.2.

$$y = \sqrt{x^2 - 8x + 17} \operatorname{arctg}(x - 4) + \ln(x - 4 + \sqrt{x^2 - 8x + 17})$$

18.3.

$$y = \arcsin e^{-2x} + \ln(e^{2x} + \sqrt{e^{4x} - 1})$$

18.4.

$$y = \ln(x - 3 + \sqrt{x^2 - 4x + 10}) - \sqrt{x^2 - 4x + 10} \operatorname{arctg}(x - 3)$$

18.5.

$$y = \arcsin e^{-2x} + \ln(e^{2x} + \sqrt{e^{4x} - 1})$$

18.6.

$$y = (\cos 2x)^{\ln \cos 2x/4}$$

18.7.

$$y = \sqrt{9x^2 - 12x + 5} \operatorname{arctg}(3x - 2) - \ln(3x - 2 + \sqrt{9x^2 - 12x + 5})$$

18.8.

$$y = \ln(3x - 2 + \sqrt{3x^2 - 4x + 1}) - \sqrt{3x^2 - 4x + 1} \operatorname{arctg}(3x - 2)$$

18.9.

$$y = \frac{4x + 1}{16x^2 + 8x + 3} + \frac{1}{\sqrt{2}} \operatorname{arctg} \frac{4x + 1}{\sqrt{2}}$$

18.13.

$$y = \frac{1}{\sqrt{2}} \operatorname{arctg} \frac{3x - 1}{\sqrt{2}} + \frac{1}{3} \frac{3x - 1}{3x^2 - 2x + 1}$$

18.10.

$$y = \ln \frac{1 + \sqrt{x - x^3}}{x + 4} + \frac{2}{x + 4} \sqrt{x - x^3}$$

18.14.

$$y = \frac{3x - 1}{x^2 - 2x + 7} - \frac{1}{\sqrt{3}} \operatorname{arctg} \frac{x - 7}{\sqrt{3}}$$

18.11.

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

18.15.

$$y = \frac{1}{\sqrt{3}} \operatorname{arctg} \frac{3x + 1}{\sqrt{3}} - \frac{3x + 1}{8x^2 + 4x + 3}$$

18.12.

$$y = \frac{x^4}{81} \arcsin \frac{3}{x} + \frac{1}{81} (x^2 + 18) \sqrt{x^2 - 9}$$

18.16.

$$y = \frac{x + 2}{x^2 + 4x + 6} + \frac{1}{\sqrt{2}} \operatorname{arctg} \frac{x + 2}{\sqrt{2}}$$

18.17.

$$y = 5x - \ln(1 + \sqrt{1 - e^{10x}}) - e^{-5x} \arcsin(e^{5x})$$

18.18.

$$y = 2x - \ln(1 + \sqrt{1 - e^{4x}}) - e^{-2x} \arcsin(e^{2x})$$

18.19.

$$y = \ln \frac{1 + \sqrt{-3 + 4x - x^2}}{2 - x} + \frac{2}{2 - x} \sqrt{-3 + 4x - x^2}$$

18.20.

$$y = \ln \frac{1 + 2\sqrt{-x - x^2}}{2x + 1} + \frac{4}{2x + 1} \sqrt{-x - x^2}$$

18.21.

$$y = e^{3x} \arcsin(e^{-3x}) - 2x - \ln(1 + \sqrt{1 - e^{9x}})$$

18.22.

$$y = 2x - \ln(1 + \sqrt{1 - e^{4x}}) - e^{-2x} \arcsin(e^{2x})$$

18.23.

$$y = e^{-7x} \arcsin(e^{7x}) + 7x - \ln(1 + \sqrt{1 - e^{14x}})$$

18.24.

$$y = 3x - \ln(1 + \sqrt{1 - e^{6x}}) - e^{-3x} \arcsin(e^{3x})$$

18.25.

$$y = e^{-3x} \operatorname{arctg}(e^{3x}) - 3x - \ln(1 + \sqrt{1 - e^{3x}})$$

18.26.

$$y = e^{2x} \arcsin(e^{-2x}) - \ln \frac{1 + 2\sqrt{x - x^2}}{x - 1}$$

18.27.

$$y = \frac{1}{\sqrt{3}} \operatorname{arctg} \frac{x + 3}{\sqrt{3}} - \frac{x + 2}{x^2 + 2x + 3}$$

18.29.

$$y = \frac{3}{3 - x} \sqrt{1 + 4x - x^2} - \ln \frac{1 + \sqrt{1 + 4x - x^2}}{3 - x}$$

18.28.

$$y = \frac{1}{16} (x^2 + 8) \sqrt{x^2 - 4} + \frac{x^4}{16} \arcsin \frac{5}{x}$$

18.30.

$$y = e^{-2x} \operatorname{arctg}(e^{2x}) + 2x - \ln(1 + \sqrt{1 - e^{4x}})$$

Задание 19. Найти производную

19.1.

$$y = \frac{1}{\sin \alpha} \ln(\operatorname{tg} x + \operatorname{ctg} x)$$

19.2.

$$y = \operatorname{arctg} \frac{\sqrt{2 \operatorname{tg} x}}{1 - \operatorname{tg} x}$$

19.3.

$$y = x \cos \alpha + \sin \alpha \ln \sin(x - \alpha)$$

19.4.

$$y = \operatorname{arctg} \frac{2 \sin x}{\sqrt{9 \cos^2 x - 4}}$$

19.5.

$$y = \frac{3^x (\ln 3 \cdot \sin 2x - x \cos x)}{\ln^2 3 + 4}$$

19.6.

$$y = \frac{5^x (2 \sin 2x + \cos 2x \cdot \ln 5)}{4 + \ln^2 5}$$

19.7.

$$y = \operatorname{arctg} \frac{\cos x}{\sqrt[4]{\cos 2x}}$$

19.8.

$$y = \ln \frac{\sqrt{2} + \operatorname{tg} x}{\sqrt{2} - \operatorname{tg} x}$$

19.9.

$$y = 3 \frac{\sin x}{\cos^2 x} + 2 \frac{\sin x}{\cos^4 x}$$

19.10.

$$y = \frac{3^x (4 \sin 4x + \ln 3 \cdot \cos 4x)}{16 + \ln^2 3}$$

19.11.

$$y = \frac{6^x (\sin 4x \cdot \ln 6 - 4 \cos 4x)}{16 + \ln^2 6}$$

19.12.

$$y = \frac{4^x (\ln 4 \cdot \sin 4x - 4 \cos 4x)}{16 + \ln^2 4}$$

19.13.

$$y = \frac{7^x (3 \sin 3x + \cos 3x \cdot \ln 7)}{9 + \ln^2 7}$$

19.14.

$$y = \frac{\cos x}{\sin^2 x} - 2 \cos x - 3 \ln \operatorname{tg} \frac{x}{2}$$

19.15.

$$y = \frac{5^x (\sin 3x \cdot \ln 5 - 3 \cos 3x)}{9 + \ln^2 5}$$

19.16.

$$y = \frac{\sin x}{\cos^3 x} - \operatorname{tg} \ln^2 \frac{x}{3}$$

19.17.

$$y = \operatorname{arctg} \frac{\sqrt{\sqrt{x^4 + 1} - x^2}}{x}$$

19.18.

$$y = x + \ln(1 + e^x) - 2e^{-x/2} \operatorname{arctg} e^{x/2}$$

19.19.

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

19.20.

$$y = \frac{2^x (\sin x + \cos x \cdot \ln 2)}{1 + \ln^2 2}$$

19.21.

$$y = (1 + x^2) e^{\operatorname{arctg} x}$$

19.22.

$$y = 2 \frac{\cos x}{\sin^4 x} + 3 \frac{\cos x}{\sin^2 x}$$

19.23.

$$y = \frac{\ln(\operatorname{ctg} x + \operatorname{ctg} \alpha)}{\sin \alpha}$$

19.24.

$$y = \frac{\operatorname{ctg} x + x}{-x \operatorname{ctg} x}$$

19.26.

$$y = \frac{1}{2 \sin(\alpha/2)} \operatorname{arctg} \frac{2x \sin(\alpha/2)}{1-x^2}$$

19.28.

$$y = \frac{1}{a(1+a^2)} \left(\operatorname{arctg}(a \cos x) + a \ln \operatorname{tg} \frac{x}{2} \right)$$

19.29.

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

19.30.

$$y = (a^2 + b^2)^{-1/2} \arcsin \left(\frac{\sqrt{a^2 + b^2} \sin x}{b} \right)$$

Задание 20. Найти производную**20.1.**

$$y = \frac{1}{4 \cos^4 x} - \frac{1}{4} \ln \frac{1 - \cos x}{1 + \cos x} - \frac{1}{\cos x}$$

20.2.

$$y = \arccos \left(\frac{\sqrt{a^2 + b^2} \cos x}{a} \right) \cdot (a^2 + b^2)^{-1/2}$$

20.3.

$$y = \frac{1}{3\sqrt{3}} \left((\sqrt{3} - 3) \cos \ln x - \sin \ln x \right) x^{\sqrt{2}+1}$$

20.4.

$$y = \frac{2}{\sqrt{5}} \operatorname{arctg} \frac{\operatorname{tg}(x/4) + 1}{\sqrt{5}} - \frac{\cos x}{3(1 + \sin x)}$$

20.5.

$$y = \frac{2^x (\ln 4 \cdot \sin x - x \cos 2x)}{\ln^3 4 - 5}$$

20.6.

$$y = 3e^{-x/3} \operatorname{arctg} e^{x/3} - x + \ln(1 + e^{3x})$$

19.25.

$$y = \frac{\cos x}{3(2 + \sin x)} + \frac{4}{2\sqrt{3}} \operatorname{arctg} \frac{2 \operatorname{tg}(x/2) + 1}{\sqrt{3}}$$

19.27.

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

20.7.

$$y = \frac{1}{\cos^2 \alpha} \ln(\operatorname{tg} x + \operatorname{ctg} x)$$

20.8.

$$y = \operatorname{arctg} \frac{\sqrt{5} \operatorname{ctg} x}{1 - \operatorname{ctg} x}$$

20.9.

$$y = \operatorname{arctg} \frac{\cos x}{\sqrt{4 \sin^2 x - 1}}$$

20.10.

$$y = \frac{2^x (2 \sin 3x + \cos 3x \cdot \ln 7)}{4 + \ln^2 7}$$

20.11.

$$y = \operatorname{arctg} \frac{\sqrt[6]{\cos 2x}}{\cos x}$$

20.12.

$$y = \ln \frac{\sqrt{3} - \operatorname{tg} x}{\sqrt{3} + \operatorname{tg} x}$$

20.13.

$$y = 3 \frac{\sin x}{\cos^4 x} - 6 \frac{\sin x}{\cos^2 x}$$

20.14.

$$y = \frac{2^x (7 \sin 7x + \ln 2 \cdot \cos 7x)}{16 + \ln^3 2}$$

20.15.

$$y = \frac{3^x (\ln 3 \cdot \sin 3x + 3 \cos 3x)}{9 + \ln^2 3}$$

20.16.

$$y = \frac{5^x (4 \sin 4x + \cos 4x \cdot \ln 17)}{34 + \ln^2 17}$$

20.17.

$$y = 3 \ln \operatorname{tg} \frac{x}{3} - \frac{\cos x}{\sin^2 x} - 7 \cos x$$

20.18.

$$y = (1 + x^3) e^{\operatorname{arcsin} x}$$

20.19.

$$y = \frac{2^x (\sin 4x \cdot \ln 15 - 6 \cos 4x)}{225 + \ln^2 15}$$

20.20.

$$y = \operatorname{tg} \ln^3 \frac{x}{4} - \frac{\sin x}{\cos^3 x}$$

20.21.

$$y = \frac{1}{(1 + a^2)} \left(\ln \operatorname{tg} \frac{x}{2} - \operatorname{arctg}(a \cos x) \right)$$

20.22.

$$y = \frac{1}{3} \ln \frac{1 + \cos x}{1 - \cos x} - \frac{1}{3 \sin^3 x} - \frac{1}{\sin x}$$

20.23.

$$y = \frac{3^x (\sin^2 x + \cos x \cdot \ln 3)}{1 + \ln^2 3}$$

20.24.

$$y = \frac{\ln(\operatorname{tg} x + \operatorname{tg} \alpha)}{\cos \alpha}$$

20.25.

$$y = \frac{\operatorname{tg} x + x^2}{x \operatorname{tg} x}$$

20.26.

$$y = 3 \frac{\cos x}{\sin^2 x} - 2 \frac{\cos x}{\sin^4 x}$$

20.27.

$$y = \frac{1}{2 \cos \alpha} \operatorname{arctg} \frac{2x \cos \alpha}{1 - x^2}$$

20.28.

$$y = \operatorname{arctg} \frac{\sqrt{x^4 - \sqrt{x^2 + 1}}}{x}$$

20.29.

$$y = \operatorname{tg} \alpha \ln \sin(x - \alpha) - x \operatorname{ctg} \alpha$$

20.30.

$$y = \frac{3^x (\sin 3x \cdot \ln 7 - 3 \cos 3x)}{14 + \ln^5 7}$$

Задание 21. Найти производную y'_x

21.1.

$$y \sin x - \cos(x - y) = 0$$

21.2.

$$x \sin y - \cos y + \cos 2y = 0$$

21.3.

$$x^{2/3} + y^{2/3} = a^{2/3}$$

21.4.

$$y = \cos(x + y)$$

21.5.

$$x - y = \arcsin x - \arcsin y$$

21.6.

$$x + y = \ln(x - y)$$

21.7.

$$2^x + 2^y = 2^{x+y}$$

21.8.

$$y = x + \operatorname{arctg} y$$

21.9.

$$y = 1 + xe^y$$

21.10.

$$\cos(xy) = x$$

21.11.

$$x^y = y^x$$

21.12.

$$2y \ln y = x$$

21.13.

$$\sin(xy) + \cos(xy) = \operatorname{tg}(x + y)$$

21.14.

$$\operatorname{tg} \frac{y}{2} = \sqrt{\frac{1-k}{1+k}} \operatorname{tg} \frac{x}{2}$$

21.15.

$$x^3 + ax^2y + bxy^2 + y^3 = 0$$

21.16.

$$y \sin x + \cos(y - x) = 0$$

21.17.

$$x \sin 2y - \sin y + \cos 2y = 0$$

21.18.

$$x^{4/3} + y^{4/3} = b^{4/3}$$

21.19.

$$y = \cos(2x + y)$$

21.20.

$$y - x = \arcsin x + \arcsin y$$

21.21.

$$x - y = \ln(x + y)$$

21.22.

$$3^x + 3^y = 3^{x+y}$$

21.23.

$$y = x - \operatorname{arcctg} 2y$$

21.24.

$$y = x + xe^y$$

21.25.

$$\sin(xy) = x$$

21.26.

$$x^{y+1} = y^{x+1}$$

21.27.

$$\ln y = 2 \frac{x}{y}$$

21.28.

$$\sin(xy) - \cos(xy) = \operatorname{tg}(x - y)$$

21.29.

$$\operatorname{tg} 2y = \sqrt{\frac{1+k}{1-k}} \operatorname{tg} 2x$$

21.30.

$$ax^3 + bx^2y + xy^2 + y^3 = 0$$

Задание 22. Найти производную y'_x

22.1.

$$\begin{cases} x = \frac{3t^2 + 1}{3t^3} \\ y = \sin(t^3 / 3 + 1) \end{cases}$$

22.2.

$$\begin{cases} x = \ln \frac{1-t}{1+t} \\ y = \sqrt{1-t^2} \end{cases}$$

22.3.

$$\begin{cases} x = \sqrt{1-t^2} \\ y = \operatorname{tg} \sqrt{1+t} \end{cases}$$

22.4.

$$\begin{cases} x = \arccos(1/t) \\ y = \sqrt{t^2 - 1} + \arcsin(1/t) \end{cases}$$

22.5.

$$\begin{cases} x = \sqrt{2t - t^2} \\ y = 1 / \sqrt[3]{(t-1)^2} \end{cases}$$

22.6.

$$\begin{cases} x = 1 / \ln t \\ y = \ln \frac{1 + \sqrt{1-t^2}}{t} \end{cases}$$

22.7.

$$\begin{cases} x = \arcsin(\cos t) \\ y = \arccos(\sin t) \end{cases}$$

22.8.

$$\begin{cases} x = \arcsin \sqrt{t} \\ y = \sqrt{1 + \sqrt{t}} \end{cases}$$

22.9.

$$\begin{cases} x = \ln(t + \sqrt{t^2 + 1}) \\ y = t\sqrt{t^2 + 1} \end{cases}$$

22.10.

$$\begin{cases} x = \arcsin^2 t \\ y = t / \sqrt{1-t^2} \end{cases}$$

22.11.

$$\begin{cases} x = \sqrt{2t - t^2} \\ y = \arcsin(t - 1) \end{cases}$$

22.12.

$$\begin{cases} x = t\sqrt{t^2 + 1} \\ y = \ln \frac{1 + \sqrt{1+t^2}}{t} \end{cases}$$

22.13.

$$\begin{cases} x = \operatorname{ctg}(2e^t) \\ y = \ln \operatorname{tg} e^t \end{cases}$$

22.14.

$$\begin{cases} x = \operatorname{arctg} t \\ y = \ln \frac{\sqrt{1+t^2}}{t+1} \end{cases}$$

22.15.

$$\begin{cases} x = \ln \operatorname{ctg} t \\ y = 1 / \cos^2 t \end{cases}$$

22.16.

$$\begin{cases} x = \ln(1 - t^2) \\ y = \arcsin \sqrt{1 - t^2} \end{cases}$$

22.17.

$$\begin{cases} x = \operatorname{arctg} e^{t/2} \\ y = \sqrt{e^t + 1} \end{cases}$$

22.18.

$$\begin{cases} x = \operatorname{arctg} \frac{t+1}{t-1} \\ y = \arcsin \sqrt{1 - t^2} \end{cases}$$

22.19.

$$\begin{cases} x = \ln \sqrt{\frac{1-t}{1+t}} \\ y = \sqrt{1-t^2} \end{cases}$$

22.20.

$$\begin{cases} x = \ln \sqrt{\frac{1 - \sin t}{1 + \sin t}} \\ y = \frac{1}{2} \operatorname{tg}^2 t + \ln \cos t \end{cases}$$

22.21.

$$\begin{cases} x = \ln(1 / \sqrt{1 - t^4}) \\ y = \arcsin \frac{1 - t^2}{1 + t^2} \end{cases}$$

22.22.

$$\begin{cases} x = \sqrt{t - t^2} - \operatorname{arctg} \sqrt{\frac{1-t}{t}} \\ y = \sqrt{t} + \sqrt{1-t} \arcsin \sqrt{t} \end{cases}$$

22.23.

$$\begin{cases} x = \sqrt{1 - t^2} \\ y = t / \sqrt{1 - t^2} \end{cases}$$

22.24.

$$\begin{cases} x = \ln \operatorname{tg} t \\ y = 1 / \sin^2 t \end{cases}$$

22.25.

$$\begin{cases} x = \arcsin \sqrt{1 - t^2} \\ y = \arccos^2 t \end{cases}$$

22.26.

$$\begin{cases} x = e^{1/\sin^2 t} \\ y = \operatorname{tg} t \ln \cos t - \operatorname{tg} t - t \end{cases}$$

22.27.

$$\begin{cases} x = t / \sqrt{1 - t^2} \\ y = \frac{\ln(1 + \sqrt{1 - t^2})}{t} \end{cases}$$

22.28.

$$\begin{cases} x = \ln(t + \sqrt{1 + t^2}) \\ y = \sqrt{1 + t^2} - \ln \frac{1 + \sqrt{1 + t^2}}{t} \end{cases}$$

22.29.

$$\begin{cases} x = (1 - \cos^2 t)^2 \\ y = \cos t / \sin^2 t \end{cases}$$

22.30.

$$\begin{cases} x = \frac{t}{\sqrt{1 - t^2}} \arcsin t + \ln \sqrt{1 - t^2} \\ y = \frac{t}{\sqrt{1 - t^2}} \end{cases}$$

Задание 23. Найти производную n -го порядка

23.1.

$$y = xe^{ax}$$

23.2.

$$y = 7^{5x}$$

23.3.

$$y = \sin 2x + \cos(x+1)$$

23.4.

$$y = \frac{x}{9(4x+9)}$$

23.5.

$$y = \sqrt[5]{e^{7x-1}}$$

23.6.

$$y = \lg(1+x)$$

23.7.

$$y = \frac{4x+7}{2x+3}$$

23.8.

$$y = \frac{4}{x}$$

23.9.

$$y = \lg(3x+1)$$

23.10.

$$y = \frac{5x+1}{13(2x+3)}$$

23.11.

$$y = a^{3x}$$

23.12.

$$y = a^2x + 3$$

23.13.

$$y = \frac{x}{2(3x+2)}$$

23.14.

$$y = \sin(3x+1)\cos 5x$$

23.15.

$$y = \lg(x+4)$$

23.16.

$$y = \sqrt{e^{3x+1}}$$

23.17.

$$y = \sqrt{x}$$

23.18.

$$y = \frac{11+12x}{6x+5}$$

23.19.

$$y = \frac{2x+5}{13(3x+1)}$$

23.20.

$$y = \lg(2x+7)$$

23.21.

$$y = 2^{3x+5}$$

23.22.

$$y = 2^{kx}$$

23.23.

$$y = \sin(x+1) + \cos 2x$$

23.24.

$$y = \frac{x}{x+1}$$

23.25.

$$y = \sqrt[3]{e^{2x+1}}$$

23.26.

$$y = \log_a(x+5)$$

23.27.

$$y = \frac{4+15x}{5x+1}$$

23.28.

$$y = \frac{1+x}{1-x}$$

23.29.

$$y = \lg(3x+1)$$

23.30.

$$y = \frac{7x+1}{17(4x+3)}$$

Задание 24. Найти производную указанного порядка

24.1.

$$y = (2x^2 - 7)\ln(x-1)$$

24.4.

$$y^{(v)} = ? \quad y = (1-x-x^2)e^{(x-1)/2} \quad y^{(iv)} = ?$$

24.2.

$$y = (x^3 + 3)\ln(x-3)$$

24.5.

$$y = x \cos x^2 \quad y^{(iii)} = ?$$

24.3.

$$y = (3-x^2)\ln^{2x}$$

24.6.

$$y = (1/x)\sin 2x \quad y^{(iii)} = ?$$

24.7.

$$y = \frac{\ln(x-1)}{\sqrt{x-1}} \quad y''' = ?$$

24.8.

$$y = (x+7)\ln(x+4) \quad y' = ?$$

24.9.

$$y = \frac{\log_2 x}{x^3} \quad y''' = ?$$

24.10.

$$y = (3x-7)3^{-x} \quad y^{IV} = ?$$

24.11.

$$y = (4x^3 + 5)e^{2x+1} \quad y' = ?$$

24.12.

$$y = \frac{\ln(2x+5)}{2x+5} \quad y''' = ?$$

24.13.

$$y = x^2 \sin(5x-3) \quad y''' = ?$$

24.14.

$$y = e^{x/2} \sin 2x \quad y^{IV} = ?$$

24.15.

$$y = \frac{\ln x}{x^2} \quad y^{IV} = ?$$

24.16.

$$y = \frac{\ln x}{x^5} \quad y''' = ?$$

24.17.

$$y = (2x+3)\ln^2 x \quad y''' = ?$$

24.18.

$$y = x \ln(1-3x) \quad y^{IV} = ?$$

24.19.

$$y = (1+x^2)\operatorname{arctg} x \quad y''' = ?$$

24.20.

$$y = (x^2 + 3x + 1)e^{3x+2} \quad y' = ?$$

24.21.

$$y = \frac{\ln x}{x^3} \quad y^{IV} = ?$$

24.22.

$$y = (5x-8)2^{-x} \quad y^{IV} = ?$$

24.23.

$$y = (4x+3)2^{-2x} \quad y' = ?$$

24.24.

$$y = \frac{\ln(x-2)}{x-2} \quad y' = ?$$

24.25.

$$y = e^{1-2x} \sin 2 + 3x \quad y^{IV} = ?$$

24.26.

$$y = e^{-x} (\cos 2x - 3 \sin 3x) \quad y^{IV} = ?$$

24.27.

$$y = (2x^3 + 1)\cos x \quad y' = ?$$

24.28.

$$y = (5x-1)\ln^2 x \quad y''' = ?$$

24.29.

$$y = \frac{\ln(3+x)}{3+x} \quad y''' = ?$$

24.30.

$$y = \frac{\log_3 x}{x^2} \quad y^{IV} = ?$$

Задание 25. Найти производную указанного порядка

25.1.

$$y = (x^3 - 1) \ln(x - 1) \quad y^{VII} = ?$$

25.2.

$$y = (x^4 - 2) \ln(x - 2) \quad y^{IV} = ?$$

25.3.

$$y = (1 - x^3) \ln x \quad y^{IV} = ?$$

25.4.

$$y = (1 + x + x^2) e^{(x-1)/3} \quad y^{III} = ?$$

25.5.

$$y = x \sin x^3 \quad y^{III} = ?$$

25.6.

$$y = (1/x) \sin(x/2) \quad y^{IV} = ?$$

25.7.

$$y = \frac{\ln(x+2)}{\sqrt{x+2}} \quad y^{IV} = ?$$

25.8.

$$y = (x+3) \ln(x+5) \quad y^{IV} = ?$$

25.9.

$$y = (\log_3 x) / x^4 \quad y^{III} = ?$$

25.10.

$$y = (2x - 17) 2^{-x} \quad y^V = ?$$

25.11.

$$y = (5x^4 + 6) e^{x+1} \quad y^V = ?$$

25.12.

$$y = \frac{\ln(x-7)}{x-7} \quad y^{IV} = ?$$

25.13.

$$y = x^3 \cos(7x - 1) \quad y^{III} = ?$$

25.14.

$$y = e^{x/3} \sin 3x \quad y^{IV} = ?$$

25.15.

$$y = (4x + 3) \ln^{4x} \quad y^{IV} = ?$$

25.16.

$$y = (\ln x) / x^4 \quad y^{III} = ?$$

25.17.

$$y = (\ln x) / x^3 \quad y^V = ?$$

25.18.

$$y = x \ln(1 + 5x) \quad y^V = ?$$

25.19.

$$y = (1 - x^2) \operatorname{arccotg} x \quad y^{III} = ?$$

25.20.

$$y = (x^2 + x + 1) e^{5x+1} \quad y^{IV} = ?$$

25.21.

$$y = (\ln x) / x^4 \quad y^V = ?$$

25.22.

$$y = (3x - 17) 3^{-x} \quad y^{IV} = ?$$

25.23.

$$y = (3x + 9) 3^{-3x} \quad y^V = ?$$

25.24.

$$y = \frac{\ln(x+5)}{x+5} \quad y^{VI} = ?$$

25.25.

$$y = e^{1-2x} \cos 2x + 3x \quad y^{IV} = ?$$

25.26.

$$y = e^{-x} (\cos 3x + 4 \sin 4x) \quad y^V = ?$$

25.27.

$$y = (x^5 + 3) \sin x \quad y^V = ?$$

25.28.

$$y = (3x - 1) \ln^3 x \quad y^{IV} = ?$$

25.29.

$$y = \frac{\ln(2-x)}{2-x} \quad y^{IV} = ?$$

25.30.

$$y = \frac{\log_2 x}{x^3} \quad y^{IV} = ?$$