Обязательные индивидуальные домашние задания

Задание № 1а

Найдите производные данных функций

1а.1	$y = \dfrac{2(3x^3 + 4x^2 - x - 2)}{15\sqrt{x+1}}$	1а.2	$y = \dfrac{(2x^2 - 1)\sqrt{1+x^2}}{3x^3}$
1а.3	$y = \dfrac{x^4 - 8x^2}{2(x^2 - 4)}$	1а.4	$y = \dfrac{2x^2 - x - 1}{3\sqrt{2+4x}}$
1а.5	$y = \dfrac{(1+x^8)\sqrt{1+x^8}}{12x^{12}}$	1а.6	$y = \dfrac{x^2}{2\sqrt{1-3x^4}}$
1а.7	$y = \dfrac{(x^2 - 6)\sqrt{(4+x^2)^3}}{120x^5}$	1а.8	$y = \dfrac{(x^2 - 8)\sqrt{x^2 - 8}}{6x^3}$
1а.9	$y = \dfrac{4+3x^3}{x\sqrt[3]{(2+x^3)^2}}$	1а.10	$y = \sqrt[3]{\dfrac{(1+x^{3/4})^2}{x^{3/2}}}$
1а.11	$y = \dfrac{x^6 + x^3 - 2}{\sqrt{1-x^3}}$	1а.12	$y = \dfrac{(x^2 - 2)\sqrt{4+x^2}}{24x^3}$
1а.13	$y = \dfrac{1+x^2}{2\sqrt{1+2x^2}}$	1а.14	$y = \dfrac{\sqrt{x-1}\,(3x-2)}{4x^2}$
1а.15	$y = \dfrac{\sqrt{(1+x^2)^3}}{3x^3}$	1а.16	$y = \dfrac{x^6 + 8x^3 - 128}{\sqrt{8-x^3}}$
1а.17	$y = \dfrac{\sqrt{2x+3}\,(x-2)}{x^2}$	1а.18	$y = \left(1-x^2\right)\sqrt[5]{x^3 + \dfrac{1}{x}}$
1а.19	$y = \dfrac{(2x^2+3)\sqrt{x^2-3}}{9x^3}$	1а.20	$y = \dfrac{x-1}{(x^2+5)\sqrt{x^2+5}}$
1а.21	$y = \dfrac{(3x-5)\sqrt{x-3x^3}}{2x^2}$	1а.22	$y = 2\sqrt{\dfrac{1-\sqrt{x}}{1+\sqrt{x}}}$
1а.23	$y = \dfrac{1}{(x+2)\sqrt{x^2+4x+5}}$	1а.24	$y = \dfrac{3\sqrt[3]{x^2+x+1}}{x+1}$

1а.25	$y = 3\sqrt[3]{\dfrac{x+1}{(x-1)^2}}$	1а.26	$y = \dfrac{x+7}{6\sqrt{x^2+2x+7}}$
1а.27	$y = \dfrac{x\sqrt{x+1}}{x^2+x+1}$	1а.28	$y = \dfrac{x^2+2}{2\sqrt{1-x^4}}$
1а.29	$y = \dfrac{(x+3)\sqrt{2x-1}}{2x+7}$	1а.30	$y = \dfrac{3x+\sqrt{x}}{\sqrt{x^2+2}}$

Задание № 1б

Найдите производные данных функций

1б.1	$y = x - \ln\left(2 + e^x + 2\sqrt{e^{2x}+e^x+1}\right)$
1б.2	$y = \dfrac{1}{8}e^{2x}\,(2 - \sin 2x - \cos 2x)$
1б.3	$y = \dfrac{1}{2}arctg\dfrac{e^x-3}{2}$
1б.4	$y = \dfrac{1}{\ln 4}\ln\dfrac{1+2^x}{1-2^x}$
1б.5	$y = 2\sqrt{e^x+1} + \ln\dfrac{\sqrt{e^x+1}-1}{\sqrt{e^x+1}+1}$
1б.6	$y = \dfrac{2}{3}\sqrt{\left(arctge^x\right)^3}$
1б.7	$y = \dfrac{1}{2}\ln\left(e^{2x}+1\right) - 2arctg\,e^x$
1б.8	$y = \ln\left(e^x+1\right) + \dfrac{18e^{2x}+27e^x+11}{6(e^x+1)}$
1б.9	$y = \dfrac{2}{\ln 2}\left(\sqrt{2^x-1} - arctg\sqrt{2^x-1}\right)$
1б.10	$y = 2(x-2)\sqrt{1+e^x} - 2\ln\dfrac{\sqrt{1+e^x}-1}{\sqrt{1+e^x}+1}$

16.11	$y = \frac{e^{a x}}{a^2 + b^2}(a \sin b x - b \cos b x)$
16.12	$y = \frac{e^{a x}}{a^2 + b^2}(b \sin b x + a \cos b x)$
16.13	$y = e^{ax}\left(\frac{1}{2a} + \frac{a\cos 2bx + 2b\sin 2bx}{2(a^2 + 4b^2)}\right)$
16.14	$y = x + \frac{1}{1 + e^x} - \ln(1 + e^x)$
16.15	$y = x - 3\ln\left((1 + e^{\frac{x}{6}})\sqrt{1 + e^{\frac{x}{3}}}\right) - 3arctg\, e^{\frac{x}{6}}$
16.16	$y = x + \frac{8}{x + e^{x/4}}$
16.17	$y = \ln\left(e^x + \sqrt{e^{2x} - 1}\right) + \sin e^{-x}$
16.18	$y = x - e^{-x}\arcsin e^x - \ln\left(1 + \sqrt{1 - e^{2x}}\right)$
16.19	$y = x - \ln(1 + e^x) - 2e^{-x/2}arctg\, e^{x/2} - \left(arctg\, e^{x/2}\right)^2$
16.20	$y = -\frac{1}{2}e^{-x^2}\left(x^4 + 2x^2 + 2\right)$
16.21	$y = 2x - \frac{p}{\cos^2 x}arctgx\left(\frac{e^{5x}}{p}\right)$
16.22	$y = 3e^{\sqrt[3]{x}}\left(\sqrt[3]{x^2} - 2\sqrt[3]{x} + 2\right)$
16.23	$y = \arcsin e^x - \sqrt{1 - e^{2x}}$
16.24	$y = e^{\sin x}\left(x - \frac{1}{\cos x}\right)$
16.25	$y = \frac{e^x}{2}\left((x^2 - 1)\cos x + (x - 1)^2 \sin x\right)$

1б.26	$y = arctg\left(e^{x} - e^{-x}\right)$
1б.27	$y = 3e^{\sqrt[3]{x}}\left(\sqrt[3]{x^5} - 5\sqrt[3]{x^4} + 2x - 6\sqrt[3]{x^2} + 12\sqrt[3]{x} - 12\right)$
1б.28	$y = -\frac{e^{3x}}{3sh^3 x}$
1б.29	$y = \ln\frac{\sqrt{1+e^{x}+e^{2x}} - e^{x} - 1}{\sqrt{1+e^{x}+e^{2x}} - e^{x} + 1}$
1б.30	$y = \frac{e^{x^2}}{1+x^3}$

Задание № 1в

Найдите производные данных функций

1в.1	$y = \sin\sqrt{3} + \frac{1}{3}\frac{\sin^2 3x}{\cos 6x}$	1в.2	$y = \cos\ln 2 - \frac{1}{3}\frac{\cos^2 3x}{\sin 6x}$
1в.3	$y = tg\ln\frac{1}{3} + \frac{1}{4}\frac{\sin^2 4x}{\cos 8x}$	1в.4	$y = ctg\sqrt[3]{5} - \frac{1}{8}\frac{\cos^2 4x}{\sin 8x}$
1в.5	$y = \frac{\cos\sin 5 \cdot \sin^2 2x}{2\cos 4x}$	1в.6	$y = \frac{\sin\cos 3 \cdot \cos^2 2x}{4\sin 4x}$
1в.7	$y = \frac{\cos\ln 7 \cdot \sin^2 7x}{7\cos 14x}$	1в.8	$y = \cos ctg 2 - \frac{1}{16}\frac{\cos^2 8x}{\sin 16x}$
1в.9	$y = ctg\cos 2 + \frac{1}{6}\frac{\cos^2 10x}{\sin 20x}$	1в.10	$y = \sqrt[3]{ctg 2} + \frac{1}{6}\frac{\sin^2 6x}{\cos 12x}$
1в.11	$y = \frac{1}{3}\cos tg\frac{1}{2} + \frac{1}{10}\frac{\sin^2 10x}{\cos 20x}$	1в.12	$y = \ln\sin\frac{1}{2} - \frac{1}{24}\frac{\cos^2 12x}{\sin 24x}$
1в.13	$y = 8\sin ctg 3 + \frac{1}{5}\frac{\sin^2 5x}{\cos 10x}$	1в.14	$y = \frac{\cos ctg 3 \cdot \cos^2 14x}{28\sin 28x}$
1в.15	$y = \frac{\cos x tg(1/3) \cdot \cos^2 16x}{32\sin 32x}$	1в.16	$y = \frac{ctg\sin(1/3) \cdot \sin^2 17x}{17\cos 34x}$

1в.17	$y = \dfrac{\sin tg(1/7) \cdot \cos^2 16x}{32 \sin 32x}$	1в.18	$y = \dfrac{\sqrt[5]{ctg2} \cdot \cos^2 18x}{36 \sin 36x}$
1в.19	$y = \dfrac{tg \ln 2 \cdot \sin^2 19x}{19 \cos 38x}$	1в.20	$y = ctg \cos 5 - \dfrac{1}{40} \dfrac{\cos^2 20x}{\sin 40x}$
1в.21	$y = \sqrt{tg4} + \dfrac{\sin^2 21x}{21 \cos 42x}$	1в.22	$y = \cos \ln 13 - \dfrac{1}{44} \dfrac{\cos^2 22x}{\sin 44x}$
1в.23	$y = \ln \cos \dfrac{1}{3} + \dfrac{\sin^2 23x}{23 \cos 46x}$	1в.24	$y = ctg \sin \dfrac{1}{13} - \dfrac{1}{48} \dfrac{\cos^2 24x}{\sin 48x}$
1в.25	$y = \sin \ln \dfrac{1}{2} + \dfrac{\sin^2 25x}{25 \cos 50x}$	1в.26	$y = \sqrt[3]{\cos \sqrt{2}} - \dfrac{1}{52} \dfrac{\cos^2 26x}{\sin 52x}$
1в.27	$y = \sqrt[7]{tg \cos 2} + \dfrac{\sin^2 27x}{27 \cos 54x}$	1в.28	$y = \sin \sqrt[3]{tg2} - \dfrac{\cos^2 28x}{56 \sin 56x}$
1в.29	$y = \cos \sin 3 + \dfrac{\sin^2 29x}{29 \cos 58x}$	1в.30	$y = \sin^2 \cos 2 - \dfrac{\cos^2 30x}{60 \sin x60}$

Задание № 1г

Найдите производные функций, заданных неявно.

1г.1	$y \arcsin x - \arccos(y - x) = 0$	1г.2	$y ctgx = \cos(x + y)$
1г.3	$x^3 + y^3 - 3axy = 0$	1г.4	$y^2 \cos x = a^2 \sin 3x$
1г.5	$y^3 - 3y + 2ay \sin x = 0$	1г.6	$y^2 - 2xy + b^2 \cos(xy) = 0$
1г.7	$x^4 + y^4 = x^2 y^2$	1г.8	$x^3 + ax^2 y + bxy^2 + y^3 = 0$
1г.9	$\sin(xy) + \cos(xy) = tg(x + y)$	1г.10	$2^x + 2^y = 2^{x+y}$
1г.11	$2y \ln y = x \arcsin x$	1г.12	$x - y = y \arcsin x - x \arcsin y$
1г.13	$x^y = y^x$	1г.14	$x \cos(xy) = ye^x$
1г.15	$x^{\frac{1}{2}} + y^{\frac{1}{2}} = a^{\frac{1}{2}}$	1г.16	$x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$
1г.17	$y = 1 + xe^y$	1г.18	$x \sin y - \cos y + \cos 2y = 0$
1г.19	$tg \frac{y}{2} = \sqrt{\dfrac{1 - k}{1 + k}} tg \frac{x}{2}$	1г.20	$\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$

1г.21	$y = x + arctg(y + e^x)$	1г.22	$y^2 \arcsin x + 2^y = x$
1г.23	$\cos x + e^{y \arcsin x} = xy$	1г.24	$y \ln(x + y) = 2^y \arccos x$
1г.25	$tg(x + 5^y) + arctg(x^y) = 0$	1г.26	$\cos x + \sqrt{y} = arcctg(2^x + y^3)$
1г.27	$\sqrt{x + \arcsin y} + \ln(x - y) = 0$	1г.28	$ctg(xy) + tg(x - y) = 2^y$
1г.29	$sh(x - y) + th(2^x) = e^y$	1г.30	$e^{2x} + \sqrt[3]{y} + ch(xy)$

Задание № 1д

Найдите производные данных функций

1д.1	$y = (cth3x)^{\arcsin x}$	1д.2	$y = (\cos(x + 2))^{\ln x}$
1д.3	$y = (\sin 3x)^{\arccos x}$	1д.4	$y = (th5x)^{\arcsin(x+1)}$
1д.5	$y = (sh(x + 2))^{\arcsin 2x}$	1д.6	$y = (\cos 5x)^{arctg\sqrt{x}}$
1д.7	$y = \left(\sqrt{3x + 2}\right)^{arcctg3x}$	1д.8	$y = (\ln(x + 3))^{\sin\sqrt{x}}$
1д.9	$y = (\log_2(x + 4))^{ctg7x}$	1д.10	$y = (sh3x)^{arctg(x+2)}$
1д.11	$y = (ch3x)^{ctg(1/x)}$	1д.12	$y = (\arcsin 5x)^{tg\sqrt{x}}$
1д.13	$y = (\arccos 5x)^{\ln(x-3)}$	1д.14	$y = (\arccos 2x)^{3arcctgx}$
1д.15	$y = (\ln(x + 7))^{ctg2x}$	1д.16	$y = (ctg(7x + 4))^{\sqrt{x+3}}$
1д.17	$y = \left(th\sqrt{x+1}\right)^{arctg2x}$	1д.18	$y = (cth(1/x))^{\arcsin 7x}$
1д.19	$y = (\cos(x + 5))^{\arcsin 3x}$	1д.20	$y = \left(\sqrt{x + 6}\right)^{\arccos 3x}$
1д.21	$y = (\sin 4x)^{arctg(1/x)}$	1д.22	$y = \left(tg3x^4\right)^{\sqrt{x+3}}$
1д.23	$y = \left(ctg2x^3\right)^{\sin\sqrt{x}}$	1д.24	$y = \left(tg7x^5\right)^{\sqrt{x+2}}$
1д.25	$y = (\arccos x)^{\sqrt{\cos x}}$	1д.26	$y = (ctg7x)^{sh(x+3)}$
1д.27	$y = (sh5x)^{arctg(x+4)}$	1д.28	$y = (arctgx)^{th(3x+1)}$
1д.29	$y = \left(cth\sqrt{x}\right)^{\sin(x+3)}$	1д.30	$y = (sh3x)^{arcctg2x}$

Задание № 1е

Вычислите производную y'_x от функций, заданных параметрически

1е.1	$\begin{cases} x = \dfrac{3t^2+1}{3t^2} \\ y = \sin\left(t^3/3 + t\right) \end{cases}$	1е.2	$\begin{cases} x = \sqrt{2t - t^2} \\ y = \dfrac{1}{\sqrt[3]{(t-1)^2}} \end{cases}$
1е.3	$\begin{cases} x = \sqrt{1 - t^2} \\ y = tg\sqrt{1+t} \end{cases}$	1е.4	$\begin{cases} x = \arcsin(\sin t) \\ y = \arccos(\cos t) \end{cases}$
1е.5	$\begin{cases} x = \ln\left(t + \sqrt{t^2+1}\right) \\ y = t\sqrt{t^2+1} \end{cases}$	1е.6	$\begin{cases} x = \sqrt{2t - t^2} \\ y = \arcsin(t-1) \end{cases}$
1е.7	$\begin{cases} x = ctg\left(2e^t\right) \\ y = \ln tg\, e^t \end{cases}$	1е.8	$\begin{cases} x = \ln ctgt \\ y = 1/\cos^2 t \end{cases}$
1е.9	$\begin{cases} x = arctg\, e^{t/2} \\ y = \sqrt{e^t + 1} \end{cases}$	1е.10	$\begin{cases} x = \ln\sqrt{\dfrac{1-t}{1+t}} \\ y = \sqrt{1 - t^2} \end{cases}$
1е.11	$\begin{cases} x = \ln\dfrac{1}{\sqrt{1-t^4}} \\ y = \arcsin\dfrac{1-t^2}{1+t^2} \end{cases}$	1е.12	$\begin{cases} x = \sqrt{1 - t^2} \\ y = \dfrac{t}{\sqrt{1-t^2}} \end{cases}$
1е.13	$\begin{cases} x = \arcsin\sqrt{1 - t^2} \\ y = \arccos^2 t \end{cases}$	1е.14	$\begin{cases} x = (1 + \cos^2 t)^2 \\ y = \cos t/\sin^2 t \end{cases}$
1е.15	$\begin{cases} x = \dfrac{t}{\sqrt{1-t^2}} \\ y = \dfrac{\ln(1+\sqrt{1-t^2})}{t} \end{cases}$	1е.16	$\begin{cases} x = \ln\dfrac{1-t}{1+t} \\ y = \sqrt{1-t^2} \end{cases}$
1е.17	$\begin{cases} x = \arccos\dfrac{1}{t} \\ y = \sqrt{t^2-1} + \arcsin\dfrac{1}{t} \end{cases}$	1е.18	$\begin{cases} x = \dfrac{1}{\ln t} \\ y = \ln\dfrac{1+\sqrt{1-t^2}}{t} \end{cases}$

1e.19	$\begin{cases} x = \arcsin\sqrt{t} \\ y = \sqrt{1+\sqrt{t}} \end{cases}$	1e.20	$\begin{cases} x = \arcsin^2 t \\ y = t/\sqrt{1-t^2} \end{cases}$
1e.21	$\begin{cases} x = t\sqrt{t^2+1} \\ y = \ln\dfrac{1+\sqrt{1+t^2}}{t} \end{cases}$	1e.22	$\begin{cases} x = arctgt \\ y = \ln\dfrac{\sqrt{1+t^2}}{t+1} \end{cases}$
1e.23	$\begin{cases} x = \ln(1-t^2) \\ y = \arcsin\sqrt{1-t^2} \end{cases}$	1e.24	$\begin{cases} x = arctg((t+1)/(t-1)) \\ y = \arcsin\sqrt{1-t^2} \end{cases}$
1e.25	$\begin{cases} x = \ln\sqrt{\dfrac{1-\sin t}{1+\sin t}} \\ y = (1/2)tg^2 t + \ln\cos t \end{cases}$	1e.26	$\begin{cases} x = \sqrt{t-t^2} - arctg\sqrt{\dfrac{1-t}{t}} \\ y = \sqrt{t} - \sqrt{1-t}\arcsin\sqrt{t} \end{cases}$
1e.27	$\begin{cases} x = \ln tgt \\ y = \dfrac{1}{\sin^2 t} \end{cases}$	1e.28	$\begin{cases} x = \dfrac{t^2\ln t}{1-t^2} + \ln\sqrt{1-t^2} \\ y = \dfrac{t\arcsin t}{\sqrt{1-t^2}} + \ln\sqrt{1-t^2} \end{cases}$
1e.29	$\begin{cases} x = e^{\sec^2 t} \\ y = tgt\ln\cos t + tgt - t \end{cases}$	1e.30	$\begin{cases} x = \ln\left(t+\sqrt{1+t^2}\right) \\ y = \sqrt{1+t^2} - \ln\dfrac{1+\sqrt{1+t^2}}{t} \end{cases}$

Задание № 2а

Составьте уравнение нормали и уравнение касательной к данной кривой в точке с абсциссой x_0

2a.1	$y = \dfrac{4x - x^2}{4},\ x_0 = 2$	2a.2	$y = \dfrac{1+\sqrt{x}}{1-\sqrt{x}},\ x_0 = 4$
2a.3	$y = 2x^2 + 3x - 1,\ x_0 = -2$	2a.4	$y = x - x^3,\ x_0 = -1$
2a.5	$y = x + \sqrt{x^3},\ x_0 = 1$	2a.6	$y = \sqrt[3]{x^2} - 20,\ x_0 = -8$
2a.7	$y = x^2 + 8\sqrt{x} - 32,\ x_0 = 4$	2a.8	$y = 8\sqrt[4]{x} - 70,\ x_0 = 16$
2a.9	$y = 2x^3 - 3x + 1,\ x_0 = 1$	2a.10	$y = 2x^2 + 3,\ x_0 = -1$

2а.11	$y = \frac{x^2 - 3x + 6}{x^2}, \ x_0 = 3$	2а.12	$y = \frac{x^3 + 2}{x^3 - 2}, \ x_0 = 2$
2а.13	$y = \sqrt{x} - 3\sqrt[3]{x}, \ x_0 = 64$	2а.14	$y = 3\left(\sqrt[3]{x} - 2\sqrt{x}\right), \ x_0 = 1$
2а.15	$y = \frac{3x - 2x^3}{3}, \ x_0 = 1$	2а.16	$y = \frac{x^{29} + 6}{x^4 + 1}, \ x_0 = 1$
2а.17	$y = 14\sqrt{x} - 15\sqrt[3]{x} + 2, \ x_0 = 1$	2а.18	$y = 3\sqrt[4]{x} - \sqrt{x}, \ x_0 = 1$
2а.19	$y = \frac{2x + 1}{x}, \ x_0 = 1$	2а.20	$y = \frac{-2(x^8 + 2)}{3(x^4 + 1)}, \ x_0 = 1$
2а.21	$y = \frac{x^5 + 1}{x^4 + 1}, \ x_0 = 1$	2а.22	$y = \frac{x^{16} + 9}{1 - 5x^2}, \ x_0 = 1$
2а.23	$y = \frac{1}{3x + 2}, \ x_0 = 2$	2а.24	$y = \frac{x}{x^2 + 2}, \ x_0 = -2$
2а.25	$y = \frac{x^2 - 3x + 3}{3}, \ x_0 = 3$	2а.26	$y = \frac{2x}{x^2 + 1}, \ x_0 = 1$
2а.27	$y = \frac{1 + 3x^2}{3 + x^2}, \ x_0 = 1$	2а.28	$y = \frac{x^2}{10} + 3, \ x_0 = 2$
2а.29	$y = -2\left(\sqrt[3]{x} + 3\sqrt{x}\right), \ x_0 = 1$	2а.30	$y = \frac{x^2 - 2x - 3}{4}, \ x_0 = 4$

Задание № 2 б

Найдите угол между линиями.

2б.1	$y = \sqrt{2x}; \ y = \frac{x^2}{2}$	2б.2	$y = \frac{1}{x}; \ y = x$
2б.3	$x^2 + y^2 - 4x = 1;$ $x^2 + y^2 - 2y = 9$	2б.4	$y = \sin x; \ y = \cos x;$ $x \in [0; 2p]$
2б.5	$y = x^2; \ y = \sqrt{x}$	2б.6	$y = \sqrt{1 - x^2}; \ y = \sqrt{x}$

2б.7	$y = x^3 - x;\ y = \frac{12}{x}$	2б.8	$x^2 + y^2 = 8ax;\ y^2 = \frac{x}{2a - x}$
2б.9	$y = x^2;\ y = x^3$	2б.10	$y = (x - 2)^2;\ y = 4x - x^2 + 4$
2б.11	$y = 2x^2 - 5;\ y = x^2 - 3x + 5$	2б.12	$y = 2x^3 - x;\ x + y = 2$
2б.13	$y = x - x^3;\ y = 5x$	2б.14	$y = 1 + \sin x;\ y = 1$
2б.15	$x^2 + y^2 = 5;\ y^2 = 4x$	2б.16	$y = \sqrt{2}\sin x;\ y = \sqrt{2}\cos x$
2б.17	$y = x^3;\ y = \frac{1}{x^2}$	2б.18	$y = \frac{1}{x};\ y = \sqrt{x}$
2б.19	$y = 8 - x^2;\ y = x^2$	2б.20	$y = 2x^2;\ y = x^3 + 2x^2 - 1$
2б.21	$x^3 + y^3 - xy - 7 = 0;$ $y = x + 1$	2б.22	$x^2 + y^2 = 4;$ $x + 2y = 2$
2б.23	$y = x^2;\ y = 5x$	2б.24	$y = x^2;\ x = y^2$
2б.25	$y = \ln x;\ y = \frac{x^2}{2e}$	2б.26	$y = \frac{2}{3}x^5 - \frac{1}{9}x^3;\ x = 1$
2б.27	$y = x^2 - 4x + 4;$ $y = -x^2 + 6x - 4$	2б.28	$y = 4x^2 + 2x - 8;$ $y = x^3 - x + 10$
2б.29	$y = x^2 \ln x;\ y = 4 - 4x^2$	2б.30	$y^2 = 2x^3;\ 64x - 48y - 11 = 0$

Задание № 3а

Вычислите пределы, используя правило Лопиталя

3а.1	$\lim\limits_{x \to 1} \frac{\ln(x + 5)}{\sqrt[4]{x + 3}}$	3а.2	$\lim\limits_{x \to 1} \frac{a^{\ln x} - x}{x - 1}$
3а.3	$\lim\limits_{x \to 0} \frac{tgx - x}{x - \sin x}$	3а.4	$\lim\limits_{x \to 1} \frac{1 - 4\sin^2(px/6)}{1 - x^2}$
3а.5	$\lim\limits_{x \to a} \arcsin\frac{x - a}{a} \cdot ctg(x - a)$	3а.6	$\lim\limits_{x \to 1} (p - 2arctgx)\ln x$
3а.7	$\lim\limits_{x \to 1} \left(a^{1/x} - 1\right)x$	3а.8	$\lim\limits_{x \to 1} \left(\frac{1}{\ln x} - \frac{x}{\ln x}\right)$

3а.9	$\lim\limits_{x\to 0}\dfrac{1-\cos x^2}{x^2-\sin x^2}$	3а.10	$\lim\limits_{x\to 0}\dfrac{tgx-x}{2\sin x+x}$
3а.11	$\lim\limits_{x\to\infty}\dfrac{e^{1/x^2}-1}{2arctgx^2-\pi}$	3а.12	$\lim\limits_{x\to 1}\dfrac{x^3-2x^2-x+2}{x^3-7x+6}$
3а.13	$\lim\limits_{x\to 0}\dfrac{x\cos x-\sin x}{x^3}$	3а.14	$\lim\limits_{x\to\infty}\dfrac{e^x}{x^5}$
3а.15	$\lim\limits_{x\to 1}\dfrac{1-x}{1-\sin(\pi x/2)}$	3а.16	$\lim\limits_{x\to\infty}\dfrac{\ln x}{\sqrt[3]{x}}$
3а.17	$\lim\limits_{x\to 0}\dfrac{ch\,x-1}{1-\cos x}$	3а.18	$\lim\limits_{x\to 0}\dfrac{\pi/x}{ctg(\pi x/2)}$
3а.19	$\lim\limits_{x\to 0}\dfrac{\ln(\sin mx)}{\ln(\sin x)}$	3а.20	$\lim\limits_{x\to\pi/2}\dfrac{tgx}{tg5x}$
3а.21	$\lim\limits_{x\to\pi/4}\dfrac{1/\cos^2 x-2tgx}{1+\cos 4x}$	3а.22	$\lim\limits_{x\to 0}(1-\cos x)ctgx$
3а.23	$\lim\limits_{x\to 1}(1-x)tg(\pi x/2)$	3а.24	$\lim\limits_{x\to\infty}x\sin(3/x)$
3а.25	$\lim\limits_{x\to -1}\dfrac{\sqrt[3]{1+2x}+1}{\sqrt{2+x}+x}$	3а.26	$\lim\limits_{x\to 0}\dfrac{x\cos x-\sin x}{x^3}$
3а.27	$\lim\limits_{x\to 1}\dfrac{1-x}{1-\sin(\pi x/2)}$	3а.28	$\lim\limits_{x\to 0}\dfrac{tgx-\sin x}{4x-\sin x}$
3а.29	$\lim\limits_{x\to\pi/2}\dfrac{tg3x}{tg5x}$	3а.30	$\lim\limits_{x\to\pi/4}\dfrac{\sec^2-2tgx}{1+\cos 4x}$

Задание № 3б

Вычислите пределы, используя правило Лопиталя

3б.1	$\lim\limits_{x\to 0}\dfrac{1-\cos 8x}{tg^2 2x}$	3б.2	$\lim\limits_{x\to\infty}x^4\sin\left(\dfrac{\pi}{3}-\dfrac{\pi}{x}\right)$
3б.3	$\lim\limits_{x\to 1}\ln x\cdot\ln(x-1)$	3б.4	$\lim\limits_{x\to\pi}(\pi-x)tg(x/2)$

3б.5	$\lim\limits_{x\to 3}\left(\frac{1}{x-3}-\frac{5}{x^2-x-6}\right)$	3б.6	$\lim\limits_{x\to 1}\left(\frac{1}{2(1-\sqrt{x})}-\frac{1}{3(1-\sqrt[3]{x})}\right)$
3б.7	$\lim\limits_{x\to 0}\frac{e^{ax}-e^{bx}}{\sin x}$	3б.8	$\lim\limits_{x\to p/2}\left(\frac{x}{ctgx}-\frac{p}{2\cos x}\right)$
3б.9	$\lim\limits_{x\to 0}\frac{x-arctgx}{x^3}$	3б.10	$\lim\limits_{x\to p/(2a)}\frac{1-\sin ax}{(2ax-p)^2}$
3б.11	$\lim\limits_{x\to p/6}\frac{1-2\sin x}{\cos 3x}$	3б.12	$\lim\limits_{x\to 0}\frac{e^{2x}-1}{\ln(1+2x)}$
3б.13	$\lim\limits_{x\to 0}\frac{a^x-1}{c^x-1}$	3б.14	$\lim\limits_{x\to 1}\frac{\ln x}{1-x^3}$
3б.15	$\lim\limits_{x\to 1}\frac{\ln x}{ctgx}$	3б.16	$\lim\limits_{x\to 0}\frac{1-\cos ax}{1-\cos bx}$
3б.17	$\lim\limits_{x\to a}\frac{x-a}{x^n-a^n}$	3б.18	$\lim\limits_{x\to 0}\frac{e^x-1}{\sin 2x}$
3б.19	$\lim\limits_{x\to 0}(x\ln x)$	3б.20	$\lim\limits_{x\to 0}\left(1-e^{2x}\right)ctgx$
3б.21	$\lim\limits_{x\to 0}\left(\frac{1}{x\sin x}-\frac{1}{x^2}\right)$	3б.22	$\lim\limits_{x\to 0}\frac{a^x-b^x}{x\sqrt{1-x}}$
3б.23	$\lim\limits_{x\to 0}\frac{e^{x^3}-1-x^3}{\sin^2 2x}$	3б.24	$\lim\limits_{x\to 0}\frac{e^{a\sqrt{x}}-1}{\sqrt{\sin bx}}$
3б.25	$\lim\limits_{x\to 0}\frac{\ln(1+x^2)}{\cos 3x-e^{-x}}$	3б.26	$\lim\limits_{x\to\infty}\frac{e^x}{x^5}$
3б.27	$\lim\limits_{x\to+\infty}\frac{\ln(x+7)}{\sqrt[7]{x-3}}$	3б.28	$\lim\limits_{x\to 0}\frac{p/x}{ctg(5x/2)}$
3б.29	$\lim\limits_{x\to 0}(1-\cos 2x)ctg4x$	3б.30	$\lim\limits_{x\to\infty}\left(x^2\sin b/x\right)$

Задание № 3в

Вычислите пределы, используя правило Лопиталя

3в.1	$\lim\limits_{x\to 0}\frac{\arcsin 4x}{5-5e^{-3x}}$	3в.2	$\lim\limits_{x\to 0}\frac{\ln\cos x}{x}$

3в.3	$\lim\limits_{x\to 0}\dfrac{e^{x^2}-1}{\cos x-1}$	3в.4	$\lim\limits_{x\to 0}\dfrac{e^{x}-x^2/2-x-1}{\cos x-x^2/2-1}$
3в.5	$\lim\limits_{x\to 0}\dfrac{e^{tgx}-1}{tgx-x}$	3в.6	$\lim\limits_{x\to 1}\dfrac{\ln(1-x)+tg(\pi x/2)}{ctg\pi x}$
3в.7	$\lim\limits_{x\to a}\dfrac{\cos x\cdot\ln(x-a)}{\ln(e^{x}-e^{a})}$	3в.8	$\lim\limits_{x\to 1}\dfrac{1}{\cos(\pi x/2)\cdot\ln(1-x)}$
3в.9	$\lim\limits_{x\to 0}\dfrac{e^{ax}-\cos bx}{e^{bx}-\cos bx}$	3в.10	$\lim\limits_{x\to 0}\dfrac{\cos(e^{x^2}-1)}{\cos x-1}$
3в.11	$\lim\limits_{x\to a}\dfrac{x^{m}-a^{m}}{x^{n}-a^{n}}$	3в.12	$\lim\limits_{x\to\infty} x\sin\dfrac{a}{6x}$
3в.13	$\lim\limits_{x\to 0}\dfrac{3tg4x-12tgx}{3\sin 4x-12\sin x}$	3в.14	$\lim\limits_{x\to \pi/4}\dfrac{\sqrt{tgx}-1}{2\sin^2 x-1}$
3в.15	$\lim\limits_{x\to 0}\dfrac{x(e^{x}+1)-2(e^{x}-1)}{x^3}$	3в.16	$\lim\limits_{x\to 0}\dfrac{\arcsin 2x-2\arcsin x}{x^3}$
3в.17	$\lim\limits_{x\to 0}\dfrac{a^{x}-a^{\sin x}}{x^3}$	3в.18	$\lim\limits_{x\to \pi/4}(tgx)^{tg2x}$
3в.19	$\lim\limits_{x\to 0}\dfrac{\ln(\cos ax)}{\ln(\cos bx)}$	3в.20	$\lim\limits_{x\to \pi/4}\dfrac{\sqrt[3]{tgx}-1}{2\sin^2 x-1}$
3в.21	$\lim\limits_{x\to 0}\left(\dfrac{1}{\sin x}-\dfrac{1}{e^{x}-1}\right)$	3в.22	$\lim\limits_{x\to 0}\dfrac{\ln(1+xe^{x})}{\ln(x+\sqrt{1+x^2})}$
3в.23	$\lim\limits_{x\to\infty} x^2 e^{-0,01x}$	3в.24	$\lim\limits_{x\to 1}(1-x)^{\log_2 x}$
3в.25	$\lim\limits_{x\to\infty}\dfrac{e^{4/x^2}-1}{2arctgx^2-\pi}$	3в.26	$\lim\limits_{x\to 1/2}\left(\dfrac{x}{3x-1}-\dfrac{1}{\ln 3x}\right)$
3в.27	$\lim\limits_{x\to 1/2}\ln 2x\cdot\ln(2x-1)$	3в.28	$\lim\limits_{x\to 0}\arcsin x\cdot tgx$
3в.29	$\lim\limits_{x\to\infty}\left(x^3 e^{-x}\right)$	3в.30	$\lim\limits_{x\to 1}(x-1)^{x-1}$

Задание № 3г

Вычислите пределы, используя правило Лопиталя

3г.1	$\lim\limits_{x\to 0}(1-\sin 2x)^{ctgx}$	3г.2	$\lim\limits_{x\to 0}(\ln(1/x))^{x}$
3г.3	$\lim\limits_{x\to 0}(\cos x)^{ctg^2 x}$	3г.4	$\lim\limits_{x\to 0} x^{x}$
3г.5	$\lim\limits_{x\to \Gamma}(\ln 2x)^{1/\ln x}$	3г.6	$\lim\limits_{x\to 0}\left(1+\sin^2 x\right)^{1/tg^2 x}$
3г.7	$\lim\limits_{x\to 1}(1-x)^{\ln x}$	3г.8	$\lim\limits_{x\to 0}(\ln(x+e))^{1/x}$
3г.9	$\lim\limits_{x\to 0}(\sin x)^{tgx}$	3г.10	$\lim\limits_{x\to \Gamma}\sqrt[x]{x}$
3г.11	$\lim\limits_{x\to 0} x^{\sin x}$	3г.12	$\lim\limits_{x\to 1}(1-x)^{\cos(px/2)}$
3г.13	$\lim\limits_{x\to 0}\left(1+x^2\right)^{1/x}$	3г.14	$\lim\limits_{x\to 1} x^{1/(x-1)}$
3г.15	$\lim\limits_{x\to 1}\left(tg\frac{px}{4}\right)^{tg(px/2)}$	3г.16	$\lim\limits_{x\to 1}\left(ctg\frac{px}{4}\right)^{tg(px/2)}$
3г.17	$\lim\limits_{x\to 0}\left(\frac{1}{x}\right)^{tgx}$	3г.18	$\lim\limits_{x\to \Gamma}\left(\frac{x-4}{x+3}\right)^{3x}$
3г.19	$\lim\limits_{x\to 0}(ctgx)^{\sin x}$	3г.20	$\lim\limits_{x\to \Gamma}(\ln x)^{1/x}$
3г.21	$\lim\limits_{x\to \Gamma} x^{6/(1+2\ln x)}$	3г.22	$\lim\limits_{x\to \Gamma}\left(1-e^{x}\right)^{1/x}$
3г.23	$\lim\limits_{x\to \Gamma}(x-1)^{1/\ln(2(x-1))}$	3г.24	$\lim\limits_{x\to \Gamma}\left(\cos\frac{m}{x}\right)^{x}$
3г.25	$\lim\limits_{x\to 0}(ctg2x)^{1/\ln x}$	3г.26	$\lim\limits_{x\to \Gamma} x^2\sin(a/x)$
3г.27	$\lim\limits_{x\to 5}\left(\frac{1}{x-5}-\frac{5}{x^2-x-20}\right)$	3г.28	$\lim\limits_{x\to 1}\left(\frac{1}{2(1-\sqrt{x})}-\frac{1}{3(1-\sqrt[3]{x})}\right)$
3г.29	$\lim\limits_{x\to 1}(1-x)^{\cos(px/2)}$	3г.30	$\lim\limits_{x\to 0}(ctgx)^{\sin x}$

Задание № 4а

Найдите наименьшее и наибольшее значения функции $y = f(x)$ на отрезке $[a; b]$

4а.1	$y = \ln\left(x^2 - 2x + 2\right),\ [0; 3]$	4а.2	$y = (x + 2)e^{1-x},\ [-2; 2]$
4а.3	$y = \dfrac{2x - 1}{(x - 1)^2},\ [-1/2; 0]$	4а.4	$y = \dfrac{3x}{x^2 + 1},\ [0; 5]$
4а.5	$y = \ln\left(x^2 - 2x + 4\right),\ [-1; 3/2]$	4а.6	$y = \sqrt{x - x^3},\ [-2; 2]$
4а.7	$y = \dfrac{x^3}{x^2 - x + 1},\ [-1; 1]$	4а.8	$y = \left(\dfrac{x + 1}{x}\right)^3,\ [1; 2]$
4а.9	$y = 4 - e^{-x^2},\ [0; 1]$	4а.10	$y = xe^{x},\ [-2; 0]$
4а.11	$y = \dfrac{x^3 + 4}{x^2},\ [1; 2]$	4а.12	$y = \dfrac{x}{9 - x^2},\ [-2; 2]$
4а.13	$y = (x - 2)e^{x},\ [-2; 1]$	4а.14	$y = (x - 1)e^{-x},\ [0; 3]$
4а.15	$y = \dfrac{1 + \ln x}{x},\ [1/e; e]$	4а.16	$y = \dfrac{x^5 - 8}{x^4},\ [-3; -1]$
4а.17	$y = e^{4x - x^2},\ [1; 3]$	4а.18	$y = x\ln x,\ \left[1/e^2; 1\right]$
4а.19	$y = \dfrac{e^{2x} + 1}{e^{x}},\ [-1; 2]$	4а.20	$y = \dfrac{x^2 - 2x + 2}{x - 1},\ [-1; 3]$
4а.21	$y = x^3 e^{x+1},\ [-4; 0]$	4а.22	$y = (x + 1)\sqrt[3]{x^2},\ [-4/5; 3]$
4а.23	$y = e^{6x - x^2},\ [-3; 3]$	4а.24	$y = 3x^4 - 16x^3 + 2,\ [-3; 1]$
4а.25	$y = \dfrac{\ln x}{x},\ [1; 4]$	4а.26	$y = \dfrac{x^4}{4} - 6x^3 + 7,\ [16; 20]$
4а.27	$y = x^5 - 5x^4 + 5x^3 + 1,\ [-1; 2]$	4а.28	$y = (3 - x)e^{-x},\ [0; 5]$
4а.29	$y = 3/2 + \cos x,\ [0; p/2]$	4а.30	$y = 108x - x^4,\ [-1; 4]$

Задание № 5а

Найдите производную указанного порядка

5а.1	$y = (2x^2 - 7)\ln(x - 1),\ y^{V} = ?$	5а.2	$y = (3 - x^2)\ln^2 x,\ y^{III} = ?$
5а.3	$y = x\cos x^2,\ y^{III} = ?$	5а.4	$y = (4x^3 + 5)e^{2x+1},\ y^{V} = ?$
5а.5	$y = \dfrac{\ln(x - 1)}{\sqrt{x - 1}},\ y^{III} = ?$	5а.6	$y = \dfrac{\log_2 x}{x^3},\ y^{III} = ?$
5а.7	$y = x^2\sin(5x - 3),\ y^{III} = ?$	5а.8	$y = (2x + 3)\ln^2 x,\ y^{III} = ?$
5а.9	$y = \dfrac{\ln x}{x^2},\ y^{IV} = ?$	5а.10	$y = \dfrac{\ln x}{x^3},\ y^{IV} = ?$
5а.11	$y = (1 + x^2)arctgx,\ y^{III} = ?$	5а.12	$y = (4x + 3)2^{-x},\ y^{V} = ?$
5а.13	$y = e^{1-2x}\sin(2 + 3x),\ y^{IV} = ?$	5а.14	$y = (x^2 + 3)\ln(x - 3),\ y^{IV} = ?$
5а.15	$y = (1 - x - x^2)e^{\frac{x-1}{2}},\ y^{IV} = ?$	5а.16	$y = \dfrac{\ln(3 + x)}{3 + x},\ y^{III} = ?$
5а.17	$y = (2x^3 + 1)\cos x,\ y^{V} = ?$	5а.18	$y = (1/x)\sin 2x,\ y^{III} = ?$
5а.19	$y = (x + 7)\ln(x + 4),\ y^{V} = ?$	5а.20	$y = (3x - 7)\,3^{-x},\ y^{IV} = ?$
5а.21	$y = \dfrac{\ln(2x + 5)}{2x + 5},\ y^{III} = ?$	5а.22	$y = \dfrac{\ln x}{x^5},\ y^{III} = ?$
5а.23	$y = e^{x/2}\sin 2x,\ y^{IV} = ?$	5а.24	$y = x\ln(1 - 3x),\ y^{IV} = ?$
5а.25	$y = (x^2 + 3x + 1)e^{3x},\ y^{V} = ?$	5а.26	$y = (5x - 8)\,2^{-x},\ y^{IV} = ?$
5а.27	$y = \dfrac{\ln(x - 2)}{x - 2},\ y^{V} = ?$	5а.28	$y = \dfrac{\log_3 x}{x^2},\ y^{IV} = ?$
5а.29	$y = (5x - 1)\ln^2 x,\ y^{III} = ?$	5а.30	$y = (x^3 + 2)\,e^{4x+3},\ y^{IV} = ?$

Задание № 5б

Вычислите производные y'_x и y''_{xx} от функций, заданных параметрически

5б.1	$\begin{cases} x = (2t + 3)\cos t \\ y = 3t^3 \end{cases}$	5б.2	$\begin{cases} x = 2\cos^2 t \\ y = 3\sin^2 t \end{cases}$

5б.3	$\begin{cases} x = 6\cos^3 t \\ y = 2\sin^3 t \end{cases}$	5б.4	$\begin{cases} x = 1/(t+2) \\ y = (t/(t+2))^2 \end{cases}$
5б.5	$\begin{cases} x = e^{-2t} \\ y = e^{4t} \end{cases}$	5б.6	$\begin{cases} x = \sqrt{t} \\ y = \sqrt[5]{t} \end{cases}$
5б.7	$\begin{cases} x = 2t/(1+t^3) \\ y = t^2/(1+t^2) \end{cases}$	5б.8	$\begin{cases} x = \sqrt{t^2-1} \\ y = (t+1)/\sqrt{t^2-1} \end{cases}$
5б.9	$\begin{cases} x = 4t + 2t^2 \\ y = 5t^3 - 3t^2 \end{cases}$	5б.10	$\begin{cases} x = (\ln t)/t \\ y = t\ln t \end{cases}$
5б.11	$\begin{cases} x = e^{t\cos t} \\ y = e^t \sin t \end{cases}$	5б.12	$\begin{cases} x = t^4 \\ y = \ln t \end{cases}$
5б.13	$\begin{cases} x = 5\cos t \\ y = 4\sin t \end{cases}$	5б.14	$\begin{cases} x = 5\cos^2 t \\ y = 3\sin^2 t \end{cases}$
5б.15	$\begin{cases} x = arctgt \\ y = \ln(1+t^2) \end{cases}$	5б.16	$\begin{cases} x = \arcsin t \\ y = \sqrt{1-t^2} \end{cases}$
5б.17	$\begin{cases} x = 3(t-\sin t) \\ y = 3(1-\cos t) \end{cases}$	5б.18	$\begin{cases} x = 3(\sin t - t\cos t) \\ y = 3(\cos t + t\sin t) \end{cases}$
5б.19	$\begin{cases} x = \sin 2t \\ y = \cos^2 t \end{cases}$	5б.20	$\begin{cases} x = e^{3t} \\ y = e^{-3t} \end{cases}$
5б.21	$\begin{cases} x = (\ln t/t) \\ y = t^2 \ln t \end{cases}$	5б.22	$\begin{cases} x = \arccos t \\ y = \sqrt{1-t^2} \end{cases}$
5б.23	$\begin{cases} x = 1/(t+1) \\ y = (t/(t+1)) \end{cases}$	5б.24	$\begin{cases} x = 5\sin^3 t \\ y = 3\cos^3 t \end{cases}$
5б.25	$\begin{cases} x = e^{-3t} \\ y = e^{8t} \end{cases}$	5б.26	$\begin{cases} x = \sqrt[3]{(t-1)^2} \\ y = \sqrt{t-1} \end{cases}$
5б.27	$\begin{cases} x = \ln^2 t \\ y = t + \ln t \end{cases}$	5б.28	$\begin{cases} x = te^t \\ y = t/e^t \end{cases}$

5б.29	$\begin{cases} x = 6t^2 - 4 \\ y = 3t^5 \end{cases}$	5б.30	$\begin{cases} x = \arcsin t \\ y = \ln t \end{cases}$

Задание № 5в

Разложите полином по степеням $(x - x_0)$, сделайте проверку, либо раскрыв скобки в разложении, либо разделив данный многочлен на $(x - x_0)$.

5в.1	$P_3(x) = x^3;\ \ x_0 = 1$
5в.2	$P_4(x) = x^4 + 8x^3 + 24x^2 + 23x + 17;\ \ x_0 = -2$
5в.3	$P_3(x) = 1 + x^2 + x^3;\ \ x_0 = -1$
5в.4	$P_6(x) = (x^3 - 8)^2;\ \ x_0 = 2$
5в.5	$P_3(x) = 2x^3 - 3x^3 + 5x + 1;\ \ x_0 = -1$
5в.6	$P_4(x) = 2x^4 - 5x^3 - 3x^2 + 8x + 4;\ \ x_0 = 2$
5в.7	$P_4(x) = x^4 - 2x^3 + 7x - 4;\ \ x_0 = 1$
5в.8	$P_6(x) = (x^2 - 2x + 3)^3;\ \ x_0 = 0$
5в.9	$P_3(x) = 4x^3 - 2x^2 + 5x - 1;\ \ x_0 = 1$
5в.10	$P_4(x) = 6x^4 + 5x^2 - 12;\ \ x_0 = -1$
5в.11	$P_6(x) = (3x^2 - 2x + 1)^3;\ \ x_0 = 0$
5в.12	$P_5(x) = 2x^5 - 10x^4 - 3x + 5;\ \ x_0 = 1$
5в.13	$P_4(x) = 8x^4 - 3x^2 + 2;\ \ x_0 = -2$
5в.14	$P_3(x) = 9x^3 + 12x^2 - 4;\ \ x_0 = 3$
5в.15	$P_4(x) = x^4 - 5x^3 + 3x^2 - 7x + 2;\ \ x_0 = -1$
5в.16	$P_6(x) = (11x^2 - 5x + 4)^3;\ \ x_0 = 0$
5в.17	$P_3(x) = 2x^3 + 3x^2 - 5x + 10;\ \ x_0 = -3$
5в.18	$P_6(x) = x^6;\ \ x_0 = 5$
5в.19	$P_6(x) = (3x^2 - x + 5)^3;\ \ x_0 = 0$

5в.20	$P_4(x) = 2x^4 - 3x^3 + 2x^2 + x - 1; \quad x_0 = 4$
5в.21	$P_3(x) = 24x^3 + 15x^2 - 11x - 3; \quad x_0 = -4$
5в.22	$P_5(x) = 2x^5 - 3x^2 + 10; \quad x_0 = -1$
5в.23	$P_4(x) = 3x^4 - 2x^2 + 1; \quad x_0 = 2$
5в.24	$P_3(x) = 5x^3 + x^2 - 20; \quad x_0 = -5$
5в.25	$P_6(x) = (2x^3 + 3x^2 - 1)^2; \quad x_0 = 0$
5в.26	$P_4(x) = x^4 - 2x^3 + 3x^2 - 10; \quad x_0 = 6$
5в.27	$P_5(x) = x^5 + 6x^4 - 4x^3 + 3x^2 + 2; \quad x_0 = -1$
5в.28	$P_4(x) = (2x^2 + 3x - 4)^2; \quad x_0 = 1$
5в.29	$P_5(x) = 3x^5 - 11x^3 + 9; \quad x_0 = -7$
5в.30	$P_3(x) = 4x^3 - 3x^2 + x - 1; \quad x_0 = 7$

Задание № 5г

Разложите по формуле Маклорена заданные функции $f(x)$ до $o(x^n)$.

5г.1	$f(x) = e^{5x-1}$	5г.2	$f(x) = \sin(2x+3)$
5г.3	$f(x) = \cos(\frac{x}{2}+2)$	5г.4	$f(x) = \ln(ex+2)$
5г.5	$f(x) = \dfrac{1}{1-2x}$	5г.6	$f(x) = \dfrac{1}{3x+4}$
5г.7	$f(x) = \dfrac{1}{\sqrt{1+4x}}$	5г.8	$f(x) = \dfrac{1}{(1-x)^2}$
5г.9	$f(x) = 3^{2-x}$	5г.10	$f(x) = (x-1)e^{x/2}$
5г.11	$f(x) = (x^2 - x)e^{-x}$	5г.12	$f(x) = (2x+1)\sqrt{1-x}$
5г.13	$f(x) = \dfrac{x^2+3x}{e^{2x}}$	5г.14	$f(x) = \ln\dfrac{1+2x}{1-x}$
5г.15	$f(x) = (2x-3)\ln(5x+6)$	5г.16	$f(x) = \ln(x^2+3x+2)$
5г.17	$f(x) = \ln(2+x-x^2)$	5г.18	$f(x) = ch(\sin x)$, до $o(x^2)$

5г.19	$f(x) = \ln\dfrac{2 - 3x}{3 + 2x}$	5г.20	$f(x) = e^{tgx}$, до $o(x^2)$
5г.21	$f(x) = e^{\sqrt{1+2x}}$, до $o(x^2)$	5г.22	$f(x) = \cos(sh\frac{x}{\sqrt{5}})$, до $o(x^2)$
5г.23	$f(x) = (1 - x + x^2)^3$, до $o(x^2)$	5г.24	$f(x) = \ln\cos x$, до $o(x^2)$
5г.25	$f(x) = arctg(\sin x)$, до $o(x^3)$	5г.26	$f(x) = e^{\sin x}$, до $o(x^3)$
5г.27	$f(x) = \ln^3(1 - x/2)$, до $o(x^3)$	5г.28	$f(x) = \sqrt[3]{1 + 3\sin x}$, до $o(x^3)$
5г.29	$f(x) = \ln(1 + \arcsin x)$ до $o(x^3)$	5г.30	$f(x) = \sqrt[3]{1 - 3\cos 2x}$, до $o(x^3)$

Задание № 6а

Найдите дифференциал dy

6а.1	$y = x\arcsin\dfrac{1}{x} - \ln\left\|x + \sqrt{x^2 - 1}\right\|,\ x > 0$
6а.2	$y = tg\left(2\arccos\sqrt{1 - 2x^2}\right),\ x > 0$
6а.3	$y = \sqrt{1 + 2x} - \ln\left(x + \sqrt{1 + 2x}\right)$
6а.4	$y = x^2 arctg\sqrt{x^2 - 1} - \sqrt{x^2 - 1}$
6а.5	$y = \arccos\left(1/\sqrt{1 + 2x^2}\right),\ x > 0$
6а.6	$y = x\ln\left\|x + \sqrt{x^2 + 3}\right\| - \sqrt{x^2 + 3}$
6а.7	$y = arctg(shx) + shx \cdot \ln(chx)$
6а.8	$y = \arccos\left((x^2 - 1)/(x^2\sqrt{2})\right)$
6а.9	$y = \ln\left(\cos^2 x + \sqrt{1 + \cos^4 x}\right)$
6а.10	$y = \ln\left(x + \sqrt{1 + x^2}\right) - \sqrt{1 + x^2}\, arctgx$
6а.11	$y = \ln\left(e^x + \sqrt{e^{2x} - 1}\right) + \arcsin e^{-x}$
6а.12	$y = \dfrac{\ln\|x\|}{1 + x^2} - \dfrac{1}{2}\ln\dfrac{x^2}{1 + x^2}$

6a.13	$y = x\sqrt{4 - x^2} + 4\arcsin(x/2)$
6a.14	$y = \ln tg\left(\frac{x}{2}\right) - \frac{x}{\sin x}$
6a.15	$y = 2x + \ln\lvert\sin x + 2\cos x\rvert$
6a.16	$y = \sqrt{ctgx} - \sqrt{tg^3(x/3)}$
6a.17	$y = \ln\left\lvert\frac{x + \sqrt{x^2+1}}{2x}\right\rvert$
6a.18	$y = \sqrt[3]{\frac{x+2}{x-2}}$
6a.19	$y = arctg\frac{x^2 - 1}{x}$
6a.20	$y = \ln\lvert x^2 - 1\rvert - \frac{1}{x^2 - 1}$
6a.21	$y = arctg\left(tg\frac{x}{2} + 1\right)$
6a.22	$y = \ln\lvert 2x + 2\sqrt{x^2 + x} + 1\rvert$
6a.23	$y = \ln\lvert\cos\sqrt{x}\rvert + \sqrt{x}\,tg\sqrt{x}$
6a.24	$y = e^x(\cos 2x + 2\sin 2x)$
6a.25	$y = x(\sin\ln x - \cos\ln x)$
6a.26	$y = \left(\sqrt{x-1} - \frac{1}{2}\right)e^{2\sqrt{x-1}}$
6a.27	$y = \cos x\,\ln tgx - \ln tg\frac{x}{2}$
6a.28	$y = \sqrt{3 + x^2} - x\ln\lvert x + \sqrt{3 + x^2}\rvert$
6a.29	$y = \sqrt{x} - (1 + x)arctg\sqrt{x}$
6a.30	$y = x\,arctgx - \ln\sqrt{1 + x^2}$

Задание № 6 б

С помощью дифференциала приближенно вычислите данные величины и оцените допущенную относительную погрешность (с точностью до двух знаков после запятой)

6б.1	$\sqrt[5]{34}$	6б.2	$\sqrt[3]{26,19}$
6б.3	$\sqrt[4]{16,64}$	6б.4	$\sqrt{8,76}$
6б.5	$\sqrt[5]{31}$	6б.6	$\sqrt[3]{70}$
6б.7	$(2,01)^3 + (2,01)^2$	6б.8	$\sqrt[3]{65}$
6б.9	$\sqrt{\frac{(2,037)^2 - 3}{(2,037)^2 + 5}}$	6б.10	$\sqrt{\frac{4 - 3,02}{1 + 3,02}}$
6б.11	$\sqrt[4]{15,8}$	6б.12	$\sqrt[3]{10}$
6б.13	$\sqrt[5]{200}$	6б.14	$(3,03)^5$
6б.15	$2,9/\sqrt{(2,9)^2 + 16}$	6б.16	$\sqrt[7]{130}$
6б.17	$\sqrt[3]{27,5}$	6б.18	$\sqrt{17}$
6б.19	$\sqrt{640}$	6б.20	$\sqrt{1,2}$
6б.21	$\sqrt[10]{1025}$	6б.22	$(3,02)^4 + (3,02)^3$
6б.23	$(5,07)^3$	6б.24	$(4,01)^{1,5}$
6б.25	$\sqrt[3]{1,02}$	6б.26	$\cos 151^\circ$
6б.27	$arctg\,1,05$	6б.28	$\cos 61^\circ$
6б.29	$tg\,44^\circ$	6б.30	$arctg\,0,98$

Задание № 7а

Постройте графики функций с помощью производной первого порядка.

7а.1	$y = 2x^3 - 9x^2 + 12x - 9$	7а.2	$y = 3x - x^2$
7а.3	$y = x^2(x - 2)^2$	7а.4	$y = 2 - 3x^2 - x^3$
7а.5	$y = (x + 1)^2(x - 1)^2$	7а.6	$y = 2x^3 - 3x^2 - 4$

7а.7	$y = 3x^2 - 2 - x^3$	7а.8	$y = (x - 1)^2(x - 3)^2$
7а.9	$y = \frac{x^3 + 3x^2}{4} - 5$	7а.10	$y = \frac{x^3 - 9x^2}{4} + 6x - 9$
7а.11	$y = 6x - 8x^3$	7а.12	$y = 16x^2(x - 1)^2$
7а.13	$y = 2x^3 + 3x^2 - 5$	7а.14	$y = 2 - 12x^2 - 8x^3$
7а.15	$y = (2x + 1)^2(2x - 1)^2$	7а.16	$y = 2x^3 + 9x^2 + 12x$
7а.17	$y = 12x^2 - 8x^3 - 2$	7а.18	$y = (2x - 1)^2(2x - 3)^2$
7а.19	$y = \frac{27(x^3 - x^2)}{4} - 4$	7а.20	$y = \frac{x(12 - x^2)}{8}$
7а.21	$y = \frac{x^2(x - 4)^2}{16}$	7а.22	$y = \frac{27(x^3 - x^2)}{4} - 5$
7а.23	$y = \frac{16 - 6x^2 - x^3}{8}$	7а.24	$y = -\frac{(x - 4)^2}{16}$
7а.25	$y = 16x^3 - 36x^2 + 24x - 9$	7а.26	$y = \frac{6x^2 - x^3 - 16}{8}$
7а.27	$y = -\frac{1}{16}(x - 2)^2(x - 6)^2$	7а.28	$y = \frac{11 + 9x - 3x^2 - x^3}{8}$
7а.29	$y = 16x^3 - 12x^2 - 4$	7а.30	$y = -\frac{(x + 1)^2(x - 3)^2}{16}$

Задание № 7б

Постройте графики функций с помощью производной первого порядка.

7б.1	$y = 1 - \sqrt[3]{x^2 - 2x}$	7б.2	$y = 2x - \sqrt[3]{x^2}$
7б.3	$y = \frac{12\sqrt[3]{6(x - 2)^2}}{x^2 + 8}$	7б.4	$y = -\frac{12\sqrt[3]{6(x - 1)^2}}{x^2 + 2x + 9}$
7б.5	$y = 1 - \sqrt[3]{x^2 + 2x}$	7б.6	$y = 2x + 6 - 3\sqrt[3]{(x + 3)^2}$
7б.7	$y = \frac{6\sqrt[3]{6(x - 3)^2}}{x^2 - 2x + 9}$	7б.8	$y = -\frac{6\sqrt[3]{6x^2}}{x^2 + 4x + 12}$
7б.9	$y = 1 - \sqrt[3]{x^2 + 4x + 3}$	7б.10	$y = 3\sqrt[3]{(x - 3)^2} - 2x + 6$
7б.11	$y = 4x + 8 - 6\sqrt[3]{(x + 2)^2}$	7б.12	$y = \sqrt[3]{x(x + 2)}$

7б.13	$y = \dfrac{3\sqrt[3]{6(x-4)^2}}{x^2-4x+12}$	7б.14	$y = -\dfrac{3\sqrt[3]{6(x+1)^2}}{x^2+6x+17}$
7б.15	$y = \sqrt[3]{x^2+4x+3}$	7б.16	$y = 6\sqrt[3]{(x-2)^2} - 4x + 8$
7б.17	$y = \dfrac{3\sqrt[3]{6(x-5)^2}}{x^2-6x+17}$	7б.18	$y = -\dfrac{3\sqrt[3]{6(x+2)^2}}{x^2+8x+24}$
7б.19	$y = 2 + \sqrt[3]{8x(x+2)}$	7б.20	$y = 6x - 6 - 9\sqrt[3]{(x-1)^2}$
7б.21	$y = \sqrt[3]{x^2+6x+8}$	7б.22	$y = \sqrt[3]{4x(x-1)}$
7б.23	$y = \sqrt[3]{x(x-2)}$	7б.24	$y = 1 - \sqrt[3]{x^2-4x+3}$
7б.25	$y = 9\sqrt[3]{(x+1)^2} - 6x - 6$	7б.26	$y = 8x - 16 - 12\sqrt[3]{(x-2)^2}$
7б.27	$y = \dfrac{6\sqrt[3]{6(x+3)^2}}{x^2+10x+33}$	7б.28	$y = -\dfrac{6\sqrt[3]{6(x-6)^2}}{x^2-8x+24}$
7б.29	$y = 12\sqrt[3]{(x+2)^2} - 2x - 8$	7б.30	$y = 3\sqrt[3]{(x+4)^2} - 2x - 8$

Задание № 7в

Исследуйте поведение функций в окрестностях заданных точек с помощью производных высших порядков.

7в.1	$y = x^2 - 4x - (x-2)\ln(x-1)$, $x_0 = 2$	7в.2	$y = 4x - x^2 - 2\cos(x-2)$, $x_0 = 2$
7в.3	$y = 6e^{x-2} - x^3 + 3x^2 - 6x$, $x_0 = 2$	7в.4	$y = 2\ln(x+1) - 2x + x^2 + 1$, $x_0 = 0$
7в.5	$y = 2x - x^2 - 2\cos(x-1)$, $x_0 = 1$	17в.6	$y = \cos^2(x+1) + x^2 + 2x$, $x_0 = -1$
7в.7	$y = 2\ln x + x^2 - 4x + 3$, $x_0 = 1$	7в.8	$y = 1 - 2x - x^2 - 2\cos(x+1)$, $x_0 = -1$

7в.9	$y = x^2 + 6x + 8 - 2e^{x+2}$, $x_0 = -2$	7в.10	$y = 4x + x^2 - 2e^{x+1}$, $x_0 = -1$
7в.11	$y = (x+1)\sin(x+1) - 2x - x^2$, $x_0 = -1$	7в.12	$y = 6e^{x-1} - 3x - x^3$, $x_0 = 1$
7в.13	$y = 2x + x^2 - (x+1)\ln(2+x)$, $x_0 = -1$	7в.14	$y = \sin^2(x+1), -2x - x^2$ $x_0 = -1$
7в.15	$y = x^2 + 4x + \cos^2(x+2)$, $x_0 = -2$	7в.16	$y = x^2 + 2\ln(x+2)$, $x_0 = -1$
7в.17	$y = 4x - x^2 + (x-2)\sin(x-2)$, $x_0 = 2$	7в.18	$y = 6e^x - x^3 - 3x^2 - 6x - 5$, $x_0 = 0$
7в.19	$y = x^2 - 2x - 2e^{x-2}$, $x_0 = 2$	7в.20	$y = \sin^2(x+2) - x^2 - 4x - 4$, $x_0 = -2$
7в.21	$y = \cos^2(x-1) + x^2 - 2x$, $x_0 = 1$	7в.22	$y = x^2 - 2x - (x-1)\ln x$, $x_0 = 1$
7в.23	$y = (x-1)\sin(x-1) + 2x - x^2$, $x_0 = 1$	7в.24	$y = x^2 - 4x + \cos^2(x-2)$, $x_0 = 2$
7в.25	$y = x^4 + 4x^3 + 12x^2 + 24(x+1-e^x)$, $x_0 = 0$	7в.26	$y = \sin^2(x-2) - x^2 + 4x - 4$, $x_0 = 2$
7в.27	$y = 6e^{x+1} - x^3 - 6x^2 - 15x - 16$, $x_0 = -1$	7в.28	$y = \sin x + sh\,x - 2x$, $x_0 = 0$
7в.29	$y = \sin^2(x-1) - x^2 + 2x$, $x_0 = 1$	7в.30	$y = \cos x + ch\,x$, $x_0 = 0$

Задание № 8а

Найдите интервалы выпуклости и вогнутости функций.

8а.1	$y = x^4 - 2x^3 + 6x - 4$	8а.2	$y = x^3 - 6x^2 + 2x - 6$
8а.3	$y = x^4 - 2x^3 - 12x^2 + 24x + 8$	8а.4	$y = 2x^4 - 3x^2 + x - 1$

8a.5	$y = x^5 - 10x^2 + 3x$	8a.6	$y = \sqrt[3]{x+3}$
8a.7	$y = \frac{1}{1-x^2}$	8a.8	$y = \frac{x^3}{12+x^2}$
8a.9	$y = \frac{\sqrt{x}}{x+1}$	8a.10	$y = \frac{x}{\sqrt[3]{x^2-1}}$
8a.11	$y = \sqrt[3]{4x^3 - 12x}$	8a.12	$y = x + \sin x$
8a.13	$y = e^{-x^2}$	8a.14	$y = e^{1/x}$
8a.15	$y = \frac{10}{x}\ln\frac{x}{10}$	8a.16	$y = \frac{x^2}{(x-1)^3}$
8a.17	$y = x\sin\ln x$	8a.18	$y = x^4 - 6x^2 + 5x$
8a.19	$y = arctg\frac{1}{x}$	8a.20	$y = 4x^3 + \frac{1}{x}$
8a.21	$y = x^4 - 12x^3 + 48x^2$	8a.22	$y = 2x^4 + 2x^3 + 3x^2 + 3x + 1$
8a.23	$y = (x^2 - 1)^3$	8a.24	$y = 36x(x-1)^3$
8a.25	$y = x + 36x^2 - 2x^3 - x^4$	8a.26	$y = e^{arctgx}$
8a.27	$y = 1 + x^2 - \frac{x^4}{2}$	8a.28	$y = \frac{x^5}{20} - x^4 + 8x^3 - 32x^2$
8a.29	$y = \sqrt[3]{x^2} - \sqrt[3]{x^2-4}$	8a.30	$y = \lvert x-1\rvert / x^2$

Задание № 9а

Найдите асимптоты и постройте графики функций.

9a.1	$y = \frac{17 - x^2}{4x - 5}$	9a.2	$y = \frac{x^2+1}{\sqrt{4x^2-3}}$
9a.3	$y = \frac{x^3 - 4x}{3x^2 - 4}$	9a.4	$y = \frac{4x^2+9}{4x+8}$

9a.5	$y = \dfrac{4x^3 + 3x^2 - 8x - 2}{2 - 3x^2}$	9a.6	$y = \dfrac{x^2 - 3}{\sqrt{3x^2 - 2}}$
9a.7	$y = \dfrac{2x^2 - 6}{x - 2}$	9a.8	$y = \dfrac{2x^3 + 2x^2 - 3x - 1}{2 - 4x^2}$
9a.9	$y = \dfrac{x^3 - 5x}{5 - 3x^2}$	9a.10	$y = \dfrac{x^2 - 6x + 4}{3x - 2}$
9a.11	$y = \dfrac{2 - x^2}{\sqrt{9x^2 - 4}}$	9a.12	$y = \dfrac{4x^3 - 3x}{4x^2 - 1}$
9a.13	$y = \dfrac{3x^2 - 7}{2x + 1}$	9a.14	$y = \dfrac{x^2 + 16}{\sqrt{9x^2 - 8}}$
9a.15	$y = \dfrac{x^3 + 3x^2 - 2x - 2}{2 - 3x^2}$	9a.16	$y = \dfrac{21 - x^2}{7x + 9}$
9a.17	$y = \dfrac{2x^2 - 1}{\sqrt{x^2 - 2}}$	9a.18	$y = \dfrac{2x^3 - 3x^2 - 2x + 1}{1 - 3x^2}$
9a.19	$y = \dfrac{x^2 - 11}{4x - 3}$	9a.20	$y = \dfrac{2x^2 - 9}{\sqrt{x^2 - 1}}$
9a.21	$y = \dfrac{x^3 - 2x^2 - 3x + 2}{1 - x^2}$	9a.22	$y = \dfrac{x^2 + 2x - 1}{2x + 1}$
9a.23	$y = \dfrac{x^3 + x^2 - 3x - 1}{2x^2 - 2}$	9a.24	$y = \dfrac{x^2 + 6x + 9}{x + 4}$
9a.25	$y = \dfrac{3x^2 - 10}{\sqrt{4x^2 - 1}}$	9a.26	$y = \dfrac{x^2 - 2x + 2}{x + 3}$
9a.27	$y = \dfrac{2x^3 + 2x^2 - 9x - 3}{2x^2 - 3}$	9a.28	$y = \dfrac{3x^2 - 10}{3 - 2x}$
9a.29	$y = \dfrac{-x^2 - 4x + 13}{4x + 3}$	9a.30	$y = \dfrac{-8 - x^2}{\sqrt{x^2 - 4}}$

Задание № 10а

Проведите полное исследование функций и постройте их графики.

10а.1	$y = (2x + 3)e^{-2(x+1)}$	10а.2	$y = (3 - x)e^{x-2}$
10а.3	$y = \dfrac{e^{2(x+1)}}{2(x+1)}$	10а.4	$y = 3\ln\dfrac{x}{x-3} - 1$
10а.5	$y = \dfrac{e^{2-x}}{2-x}$	10а.6	$y = \ln\dfrac{x}{x+2} + 1$
10а.7	$y = (x-2)e^{3-x}$	10а.8	$y = -(2x+1)e^{2(x+1)}$
10а.9	$y = \dfrac{e^{2(x-1)}}{2(x-1)}$	10а.10	$y = 3 - 3\ln\dfrac{x}{x+4}$
10а.11	$y = \dfrac{e^{2(x+2)}}{2(x+2)}$	10а.12	$y = \ln\dfrac{x}{x-2} - 2$
10а.13	$y = (2x+5)e^{-2(x+2)}$	10а.14	$y = (4-x)e^{x-3}$
10а.15	$y = \dfrac{e^{3-x}}{3-x}$	10а.16	$y = 2\ln\dfrac{x}{x+1} - 1$
10а.17	$y = -\dfrac{e^{-2(x+2)}}{2(x+2)}$	10а.18	$y = 2\ln\dfrac{x+3}{x} - 3$
10а.19	$y = (2x-1)e^{2(1-x)}$	10а.20	$y = -(x+1)e^{x+2}$
10а.21	$y = -\dfrac{e^{-(x+2)}}{x+2}$	10а.22	$y = 2\ln\dfrac{x}{x-4} - 3$
10а.23	$y = \dfrac{e^{x+3}}{x+3}$	10а.24	$y = \ln\dfrac{x}{x+5} - 1$
10а.25	$y = -(2x+3)e^{2(x+2)}$	10а.26	$y = (x+4)e^{-(x+3)}$
10а.27	$y = -\dfrac{e^{-2(x-1)}}{2(x-1)}$	10а.28	$y = \ln\dfrac{x-5}{x} + 2$
10а.29	$y = \dfrac{e^{x-3}}{x-3}$	10а.30	$y = 2\ln\dfrac{4x-2}{x} + 1$

Упражнения по технике дифференцирования функции одного аргумента

Задание № 11

Найдите производные данных функций

11.1	$y = 2x^5 - \frac{4}{x^3} + \frac{1}{x} + 3\sqrt{x}$	11.2	$y = \frac{3}{x} + \sqrt[5]{x^2} - 4x^3 + \frac{2}{x^4}$
11.3	$y = 3x^4 + \sqrt[3]{x^5} - \frac{2}{x} - \frac{4}{x^2}$	11.4	$y = 7\sqrt{x} - \frac{2}{x^5} - 3x^2 + \frac{4}{x}$
11.5	$y = 7x + \frac{5}{x^2} - \sqrt[7]{x^4} + \frac{6}{x}$	11.6	$y = 5x^2 - \sqrt[3]{x^4} + \frac{4}{x} - \frac{5}{x}$
11.7	$y = 3x^5 - \frac{3}{x} - \sqrt{x^3} + \frac{10}{x^5}$	11.8	$y = \sqrt[3]{x^7} + \frac{3}{x} - 4x^6 + \frac{4}{x^5}$
11.9	$y = 8x^2 + \sqrt[3]{x^4} - \frac{4}{x} - \frac{2}{x^3}$	11.10	$y = 4x^6 + \frac{5}{x} - \sqrt[3]{x^7} - \frac{7}{x^4}$
11.11	$y = 2\sqrt{x^3} - \frac{7}{x} + 3x^2 - \frac{2}{x^5}$	11.12	$y = 4x^3 - \frac{3}{x} - \sqrt[5]{x^2} + \frac{6}{x^2}$
11.13	$y = 5x^3 - \frac{8}{x^2} + 4\sqrt{x} + \frac{1}{x}$	11.14	$y = \frac{9}{x^3} + \sqrt[3]{x^4} - \frac{2}{x} + 5x^4$
11.15	$y = \frac{4}{x^5} - \frac{9}{x} + \sqrt[5]{x^2} - 7x^3$	11.16	$y = \frac{8}{x^3} + \frac{3}{x} - 4\sqrt{x^3} + 2x^7$
11.17	$y = 5x^2 + \frac{4}{x} - \sqrt[3]{x^7} - 2x^6$	11.18	$y = 10x^2 + 3\sqrt{x^5} - \frac{4}{x} - \frac{5}{x^4}$
11.19	$y = \sqrt{x^5} - \frac{3}{x} + \frac{4}{x^3} - 3x^3$	11.20	$y = 9x^4 + \frac{5}{x} - \frac{7}{x^3} + \sqrt[3]{x^7}$
11.21	$y = 3\sqrt{x} + \frac{4}{x^5} + \sqrt[3]{x^2} - \frac{7}{x}$	11.22	$y = \sqrt{x^3} + \frac{2}{x} - \frac{4}{x^5} - 5x^3$
11.23	$y = 7x^2 + \frac{3}{x} - \sqrt[5]{x^4} + \frac{8}{x^3}$	11.24	$y = 8x^3 - \frac{4}{x} - \frac{7}{x^4} + \sqrt[7]{x^2}$
11.25	$y = 8x - \frac{5}{x^4} + \frac{1}{x} - \sqrt[5]{x^4}$	11.26	$y = \sqrt[4]{x^3} - \frac{5}{x} + \frac{4}{x^5} + 3x$
11.27	$y = 4x^5 + \frac{3}{x} - \sqrt[3]{x^5} - \frac{3}{x^4}$	11.28	$y = 4x^5 - \frac{5}{x} - \sqrt{x^3} + \frac{2}{x}$
11.29	$y = \frac{7}{x} + \frac{4}{x^3} - \sqrt[5]{x^3} - 2x^6$	11.30	$y = \frac{6}{x^4} - \frac{3}{x} + 3x^3 - \sqrt{x^7}$

Задание № 12

Найдите производные данных функций

12.1	$y = \sqrt[3]{3x^4 + 2x - 5} + \frac{4}{(x - 2)^5}$	12.2	$y = \sqrt[3]{(x - 3)^4} - \frac{3}{2x^3 - 3x + 1}$
12.3	$y = \sqrt{(x - 4)^5} + \frac{5}{(2x^2 + 4x - 1)^2}$	12.4	$y = \sqrt[5]{7x^2 - 3x + 5} - \frac{5}{(x - 1)^3}$
12.5	$y = \sqrt[4]{3x^2 - x + 5} - \frac{3}{(x - 5)^4}$	12.6	$y = \sqrt{3x^4 - 2x^3 + x} - \frac{4}{(x + 2)^3}$
12.7	$y = \sqrt[3]{(x - 7)^5} + \frac{5}{4x^2 + 3x - 5}$	12.8	$y = \sqrt[5]{(x + 4)^6} - \frac{2}{2x^2 - 3x + 7}$
12.9	$y = \frac{3}{(x - 4)^7} - \sqrt{5x^2 - 4x + 3}$	12.10	$y = \sqrt[3]{4x^2 - 3x - 4} - \frac{2}{(x - 3)^5}$
12.11	$y = \frac{7}{(x - 1)^3} + \sqrt{8x - 3 + x^2}$	12.12	$y = \sqrt[5]{3x^2 + 4x - 5} + \frac{4}{(x - 4)^4}$
12.13	$y = \sqrt[3]{5x^4 - 2x + 1} + \frac{8}{(x - 5)^2}$	12.14	$y = \frac{3}{(x + 2)^5} - \sqrt[7]{5x - 7x^2 - 3}$
12.15	$y = \sqrt[4]{(x - 1)^5} - \frac{4}{7x^2 - 3x + 2}$	12.16	$y = \sqrt[5]{(x - 2)^6} - \frac{3}{7x^3 - x^2 - 4}$
12.17	$y = \frac{3}{(x + 4)^2} - \sqrt[3]{4 + 3x - x^4}$	12.18	$y = \frac{2}{(x - 1)^3} - \frac{8}{6x^2 + 3x - 7}$
12.19	$y = \sqrt{1 + 5x - 2x^2} + \frac{3}{(9x - 3)^4}$	12.20	$y = \sqrt[3]{5 + 4x - x^2} - \frac{5}{(x + 1)^3}$
12.21	$y = \sqrt[4]{5x^2 - 4x + 1} - \frac{7}{(x - 5)^2}$	12.22	$y = \sqrt[5]{3 - 7x + x^2} - \frac{4}{(x - 7)^5}$
12.23	$y = \sqrt{(x - 3)^7} + \frac{9}{7x^2 - 5x - 8}$	12.24	$y = \sqrt[3]{(x - 8)^4} - \frac{2}{1 + 3x - 4x^2}$
12.25	$y = \frac{3}{4x - 3x^2 + 1} - \sqrt{(x - 1)^5}$	12.26	$y = \frac{3}{x - 4} + \sqrt[6]{(2x^2 - 3x + 1)^5}$
12.27	$y = \frac{4}{(x - 7)^3} - \sqrt[3]{(3x^2 - x + 1)^4}$	12.28	$y = \sqrt{(x - 4)^7} - \frac{10}{(3x^2 - 5x + 1)^4}$
12.29	$y = \frac{7}{(x + 2)^5} - \sqrt{8 - 5x + 2x^2}$	12.30	$y = \sqrt[3]{(x - 1)^5} + \frac{5}{2x^2 - 4x + 7}$

Задание № 13

Найдите производные данных функций

13.1	$y = \sin^3 2x \cdot \cos 8x^5$	13.2	$y = \cos^5 3x \cdot tg(4x+1)^3$
13.3	$y = tg^4 x \cdot \arcsin 4x^5$	11.4	$y = ctg\,3x \cdot \arccos 3x^2$
13.5	$y = \arcsin^3 2x \cdot ctg\,7x^4$	13.6	$y = \arccos^2 4x \cdot \ln(x-3)$
13.7	$y = \ln^5 x \cdot arctg\,7x^4$	13.8	$y = arctg^3 4x \cdot 3^{\sin x}$
13.9	$y = 2^{\cos x} \cdot arcctg\,5x^3$	13.10	$y = 4^{-x} \cdot \ln^5(x-2)$
13.11	$y = 3^{tgx} \cdot \arcsin 7x^4$	13.12	$y = 5^{x^2} \cdot \arccos 2x^5$
13.13	$y = \sin^4 3x \cdot arctg\,2x^3$	13.14	$y = \cos^3 4x \cdot arcctg\sqrt{x}$
13.15	$y = tg^3 2x \cdot \arccos 2x^3$	13.16	$y = ctg^7 x \cdot \arcsin x^5$
13.17	$y = e^{-\sin x} \cdot tg\,7x^6$	13.18	$y = e^{\cos x} \cdot ctg\,8x^3$
13.19	$y = \cos^5 x \cdot \arccos 4x$	13.20	$y = \sin^3 7x \cdot arcctg\,5x^2$
13.21	$y = \sin^2 3x \cdot arcctg\,3x^5$	13.22	$y = \cos\sqrt[5]{x} \cdot arctgx^4$
13.23	$y = tg^6 2x \cdot \cos 7x^2$	13.24	$y = ctg^3 4x \cdot \arcsin\sqrt{x}$
13.25	$y = ctg\frac{1}{x} \cdot \arccos x^4$	13.26	$y = tg\frac{1}{\sqrt{x}} \cdot arcctg\,3x^5$
13.27	$y = tg^3 2x \cdot \arccos 2x^3$	13.28	$y = 2^{tgx} \cdot arctg^5 3x$
13.29	$y = \sin^5 3x \cdot arctg\sqrt{x}$	13.30	$y = \cos^4 3x \cdot \arcsin 3x^2$

Задание № 14

Найдите производные данных функций

14.1	$y = arcctg^2 5x \cdot \ln(x-4)$	14.2	$y = arctg^3 2x \cdot \ln(x+5)$
14.3	$y = \arccos^4 x \cdot \ln(x^2+x-1)$	14.4	$y = \sqrt{\arccos 2x} \cdot 3^{-x}$
14.5	$y = tg^4 3x \cdot arcctg\,7x^2$	14.6	$y = 5^{-x^2} \cdot \arcsin 3x^3$
14.7	$y = arctg^5 x \cdot \log_2(x-2)$	14.8	$y = \log_3(x+5) \cdot \arccos 3x$
14.9	$y = e^{-x} \cdot \arcsin^2 5x$	14.10	$y = \log_4(x-1) \cdot \arcsin^4 x$
14.11	$y = (x-4)^5 \cdot arcctg\,3x^2$	14.12	$y = ctg^3 4x \cdot arctg\,2x^3$

14.13	$y = e^{-\cos x} \cdot arctg\, 7x^5$	14.14	$y = (x+1)^4 \cdot \arccos 4x^6$
14.15	$y = 2^{\sin x} \cdot arcctg\, 5x^4$	14.16	$y = 3^{-x^3} \cdot arctg\, 2x^5$
14.17	$y = 3^{\cos x} \cdot \arcsin^2 3x$	14.18	$y = \ln(x-10) \cdot \arccos^2 4x$
14.19	$y = \lg(x-2) \cdot \arcsin^5 3x$	14.20	$y = \log_3(5x-2) \cdot arctg^5 7x$
14.21	$y = \ln(x+5) \cdot arcctg^3 2x$	14.22	$y = \lg(7x+9) \cdot \arccos^2 4x$
14.23	$y = 4^{-\sin x} \cdot arctg\, 3x$	14.24	$y = 2^{\cos x} \cdot arcctg^2 4x$
14.25	$y = \log_5(2x-5) \cdot \arcsin^2 5x$	14.26	$y = \log_3(2x-9) \cdot \arccos^2 x$
14.27	$y = 2^{-x} arctg^3 4x$	14.28	$y = \ln(x-4) \cdot arcctg^4 3x$
14.29	$y = \lg(3x+4) \cdot arcctg^3 2x$	14.30	$y = \log_5(3x+1) \cdot arctg^5 x^3$

Задание № 15

Найдите производные данных функций

15.1	$y = tg^4 3x \cdot \arcsin 2x^3$	15.2	$y = (x-2)^4 \arcsin 5x^4$
15.3	$y = 2^{-x^3} arctg\, 7x^4$	15.4	$y = (x+6)^5 arcctg\, 3x^5$
15.5	$y = 3^{\cos x} \ln(x^2 - 3x + 7)$	15.6	$y = \log_2(x-7) arctg\sqrt{x}$
15.7	$y = \arccos^5 3x \cdot tgx^4$	15.8	$y = (x-5)^7 arcctg\, 7x^3$
15.9	$y = \arccos x^2 \cdot ctg\, 7x^3$	15.10	$y = 5^{-x^2} \arccos 5x^4$
15.11	$y = arcctg^4 x \cdot \cos 7x^4$	15.12	$y = 4(x-6)^7 \arcsin 3x^5$
15.13	$y = (x+5)^2 \arccos^3 5x$	15.14	$y = (x+2)^7 \arccos\sqrt{x}$
15.15	$y = 2^{-\sin x} \arcsin^3 2x$	15.16	$y = (x-7)^5 \arcsin 7x^4$
15.17	$y = \ln(x-3) \cdot \arccos 3x^4$	15.18	$y = \log_2(x-4) \cdot arctg^3 4x$
15.19	$y = (x-7)^4 arcctg^2 7x$	15.20	$y = \sqrt[3]{x-5} \arccos^4 2x$
15.21	$y = \sqrt[4]{2x-5} \arcsin^4 5x$	15.22	$y = (3x-4)^5 \arccos 3x^6$
15.23	$y = \sqrt{(5x-3)^5} \arcsin 2x^3$	15.24	$y = 2\sqrt[3]{(x+1)^2} \arccos 3x$
15.25	$y = tg^3 5x \cdot arcctg\, 3x$	15.26	$y = \sqrt{(3x-2)^3} arctg(7x-1)$
15.27	$y = \sqrt[5]{(3x-4)^3} \arcsin 7x^2$	15.28	$y = \arcsin^3 4x \cdot ctg\, 3x$
15.29	$y = e^{-\cos x} \arcsin 5x$	15.30	$y = 5\sqrt{(3x+5)^3} \arccos^4 x$

Задание № 16

Найдите производные данных функций

16.1	$y = (x - 3)^4 \arccos 5x^3$	16.2	$y = (3x - 4)^3 \arccos 3x^2$
16.3	$y = sh^3 4x \cdot \arccos \sqrt{x}$	16.4	$y = th^2 \sqrt{x} \cdot arcctg\, 3x^2$
16.5	$y = cth^3 5x \cdot \arcsin 3x^2$	16.6	$y = ch\frac{1}{x} \cdot arctg(7x + 2)$
16.7	$y = ch^3 4x \cdot \arccos 4x^2$	16.8	$y = sh^3 3x \cdot arcctg\, 5x^2$
16.9	$y = th^5 3x \cdot \arcsin \sqrt{x}$	16.10	$y = cth^2(x + 1) \cdot \arccos \frac{1}{x}$
16.11	$y = sh^4 2x \cdot \arccos x^2$	16.12	$y = ch^3(3x + 2) \cdot arctg\, 3x$
16.13	$y = th^3 4x \cdot arcctg\, 3x^4$	16.14	$y = cth^4 7x \cdot \arcsin \sqrt{x}$
16.15	$y = sh^3 2x \cdot \arcsin 7x^2$	16.16	$y = th^5 4x \cdot \arccos 3x^4$
16.17	$y = ch^2 5x \cdot arctg \sqrt{x}$	16.18	$y = cth^4 2x \cdot arctg x^3$
16.19	$y = sh^4 5x \cdot \arccos 3x^2$	16.20	$y = ch^3 9x \cdot arctg(5x - 4)$
16.21	$y = th^4 3x arcctg \frac{1}{x}$	16.22	$y = cth^3 4x \cdot \arcsin(3x - 1)$
16.23	$y = ch^5 2x \cdot arctg x^4$	16.24	$y = th^4 7x \cdot \arccos x^3$
16.25	$y = cth 4x^5 \cdot \arccos 2x$	16.26	$y = cth 3x \cdot \arcsin^4 2x$
16.27	$y = th^5 3x \cdot arcctg \sqrt{x}$	16.28	$y = sh^4 3x \cdot \arccos 5x^4$
16.29	$y = cth^2 4x \cdot \arcsin x^3$	16.30	$y = th^3 5x \cdot arcctg(2x - 5)$

Задание № 17

Найдите производные данных функций

17.1	$y = \frac{e^{\arccos^3 x}}{\sqrt{x + 5}}$	17.2	$y = \frac{(x - 4)^2}{e^{arcctgx}}$
17.3	$y = \frac{e^{-x^2}}{\sqrt{x^2 + 5x - 1}}$	17.4	$y = \frac{e^{-ctg 5x}}{3x^2 - 4x + 2}$

17.5	$y = \frac{\sqrt{7x^3 - 5x + 2}}{e^{\cos x}}$	17.6	$y = \frac{e^{tg\,3x}}{\sqrt{3x^2 - x + 4}}$
17.7	$y = \frac{e^{\sin x}}{(3x - 5)^7}$	17.8	$y = \frac{\sqrt[3]{2x^2 - 3x + 1}}{e^{-x}}$
17.9	$y = \frac{\sqrt{x^3 + 4x - 5}}{e^{x^3}}$	17.10	$y = \frac{e^{ctg\,5x}}{(2x + 4)^3}$
17.11	$y = \frac{\sqrt{3 + 2x - x^2}}{e^x}$	17.12	$y = \frac{e^{3x}}{\sqrt{3x^2 - 4x - 7}}$
17.13	$y = \frac{e^{-\sin 2x}}{(3x + 5)^4}$	17.14	$y = \frac{e^{\cos 5x}}{\sqrt{x^2 - 5x - 2}}$
17.15	$y = \frac{(2x + 5)^3}{e^{ctgx}}$	17.16	$y = \frac{e^{-tg\,3x}}{4x^2 - 3x + 5}$
17.17	$y = \frac{e^{-\sin 4x}}{(3x - 5)^6}$	17.18	$y = \frac{3x^2 - 5x + 10}{e^{-x^4}}$
17.19	$y = \frac{e^{-x}}{(2x^2 - x + 4)^2}$	17.20	$y = \frac{e^{4x}}{(3x + 5)^3}$
17.21	$y = \frac{e^{ctg\,5x}}{(3x - 5)^4}$	17.22	$y = \frac{(2x - 3)^7}{e^{-2x}}$
17.23	$y = \frac{(3x + 1)^4}{e^{4x}}$	17.24	$y = \frac{5x^2 + 4x - 2}{e^{-x}}$
17.25	$y = \frac{\sqrt{5x^2 - x + 1}}{e^{3x}}$	17.26	$y = \frac{e^{-x^2}}{(2x - 5)^7}$
17.27	$y = \frac{e^{\cos 3x}}{(2x + 4)^5}$	17.28	$y = \frac{e^{\sin 5x}}{(3x - 2)^2}$
17.29	$y = \frac{\sqrt{x^2 - 3x - 7}}{e^{-x^3}}$	17.30	$y = \frac{e^{-tgx}}{4x^2 + 7x - 5}$

Задание № 18

Найдите производные данных функций

18.1	$y = \frac{\log_5(3x - 7)}{ctg\,7x^3}$	18.2	$y = \frac{\ln(5x - 3)}{4tg\,3x^4}$
18.3	$y = \frac{\ln(7x + 2)}{5\cos^3 4x}$	18.4	$y = \frac{\sin^3 5x}{\ln(2x - 3)}$
18.5	$y = \frac{\cos^2 3x}{\lg(3x - 4)}$	18.6	$y = \frac{tg^3 2x}{\lg(5x + 1)}$
18.7	$y = \frac{\log_3(4x + 5)}{2ctg\sqrt{x}}$	18.8	$y = \frac{\ln(7x - 3)}{3tg^2 4x}$
18.9	$y = \frac{\lg(11x + 3)}{\cos^2 5x}$	18.10	$y = \frac{ctg^2 5x}{\ln(7x - 2)}$
18.11	$y = \frac{tg^2(x - 2)}{\lg(x + 3)}$	18.12	$y = \frac{\sin^3(5x + 1)}{\lg(3x - 2)}$
18.13	$y = \frac{\cos^3(7x - 1)}{\lg(x + 5)}$	18.14	$y = \frac{\sin^3(4x + 3)}{\ln(7x + 1)}$
18.15	$y = \frac{ctg^3(2x - 3)}{\log_3(x + 2)}$	18.16	$y = \frac{\lg^3 x}{\sin 5x^2}$
18.17	$y = \frac{\ln^2(x + 1)}{\cos 3x^4}$	18.18	$y = \frac{\log_2(7x - 5)}{tg\sqrt{x}}$
18.19	$y = \frac{\log_3(4x - 2)}{ctg^3 2x}$	18.20	$y = \frac{\ln^3(x - 5)}{tg(1/x)}$
18.21	$y = \frac{\lg\,(x + 2)}{\sin 2x^5}$	18.22	$y = \frac{tg^3 7x}{\ln(3x + 2)}$
18.23	$y = \frac{ctg\sqrt{2x - 3}}{\lg(3x + 4)}$	18.24	$y = \frac{tg(3x - 5)}{\ln^2(x + 3)}$
18.25	$y = \frac{\cos^2 x}{\lg(x^2 - 2x + 1)}$	18.26	$y = \frac{\log_2(3x - 7)}{tg\,3x}$
18.27	$y = \frac{\ln^3(x - 3)}{ctg(x - 3)}$	18.28	$y = \frac{tg^4 5x}{\ln(x + 7)}$
18.29	$y = \frac{\log_3(2x - 1)}{\cos^5 x}$	18.30	$y = \frac{tg^4 3x}{\lg(x^2 - x + 4)}$

Задание № 19

Найдите производные данных функций

19.1	$y = \frac{arcctg^4 5x}{sh\sqrt{x}}$	19.2	$y = \frac{arctg^3 2x}{ch(1/x)}$
19.3	$y = \frac{\arccos 3x^4}{th^2 x}$	19.4	$y = \frac{\arcsin 5x^3}{ch\sqrt{x}}$
19.5	$y = \frac{cth^3(x+1)}{\arccos 2x}$	19.6	$y = \frac{th3x^5}{arctg^2 3x}$
19.7	$y = \frac{\arccos^7 2x}{thx^5}$	19.8	$y = \frac{\arcsin^3 5x}{sh(3x+1)}$
11.9	$y = \frac{th^4(2x+5)}{\arccos 3x}$	19.10	$y = \frac{\sqrt[3]{arctg2x}}{sh^2 x}$
19.11	$y = \frac{\arcsin^2 4x}{th(5x-3)}$	19.12	$y = \frac{ch^2(4x+2)}{arctgx^3}$
19.13	$y = \frac{\arcsin 4x^5}{th^3 x}$	19.14	$y = \frac{arctg^3(2x+1)}{ch\sqrt{x}}$
19.15	$y = \frac{\arccos 4x^3}{sh^4 x}$	19.16	$y = \frac{cth^2(x-2)}{\arccos 3x}$
19.17	$y = \frac{th^2(2x+2)}{\arcsin 5x}$	19.18	$y = \frac{cth^2(3x-1)}{\arccos x^2}$
19.19	$y = \frac{sh^5 x}{\arccos 4x}$	19.20	$y = \frac{\sqrt{ch^3 x}}{arctg5x}$
19.21	$y = \frac{th^2(x+3)}{arcctg\sqrt{x}}$	19.22	$y = \frac{\arcsin^3 3x}{ch(x-5)}$
19.23	$y = \frac{arcctg^3 x}{sh(2x-5)}$	19.24	$y = \frac{\arccos^3 5x}{th(x-2)}$
19.25	$y = \frac{\sqrt{\arccos 3x}}{sh^2 x}$	19.26	$y = \frac{\arcsin^2 3x}{\sqrt{thx}}$
19.27	$y = \frac{arctg^2 5x}{\sqrt[3]{cthx}}$	19.28	$y = \frac{arctg^2 5x}{th(x+3)}$
19.29	$y = \frac{\sqrt{sh^3 x}}{arcctg5x}$	19.30	$y = \frac{\sqrt[5]{ch3x}}{arctg(x+2)}$

Задание № 20

Найдите производные данных функций

20.1	$y = \frac{9arctg(x+7)}{(x-1)^2}$	20.2	$y = \frac{8arctg(2x+3)}{(x+1)^3}$
20.3	$y = \frac{7\arccos(4x-1)}{(x+2)^4}$	20.4	$y = \frac{6\arcsin(x+5)}{(x-2)^5}$
20.5	$y = \frac{3arcctg(2x-5)}{(x+1)^4}$	20.6	$y = \frac{2arctg(3x+2)}{(x-3)^2}$
20.7	$y = \frac{4\arccos 3x}{(x+2)^5}$	20.8	$y = \frac{\arcsin(3x+8)}{(x-7)^3}$
20.9	$y = \frac{7arctg(4x+1)}{(x-4)^4}$	20.10	$y = \frac{3\arcsin(2x-7)}{(x+2)^4}$
20.11	$y = \frac{2\lg(4x+5)}{(x+6)^4}$	20.12	$y = \frac{5\ln(5x+7)}{(x-7)^2}$
20.13	$y = \frac{4\log_3(3x+1)}{(x+1)^2}$	20.14	$y = \frac{7\log_4(2x-5)}{(x-1)^5}$
20.15	$y = \frac{\ln(7x+2)}{(x-6)^4}$	20.16	$y = \frac{4\lg(3x+7)}{(x+1)^7}$
20.17	$y = \frac{5\log_2(x^2+1)}{(x-3)^4}$	20.18	$y = \frac{6\log_3(2x+9)}{(x+4)^2}$
20.19	$y = \frac{3\log_2(5x-4)}{(x-3)^5}$	20.20	$y = \frac{7\log_5(x^2+x)}{(x+3)^3}$
20.21	$y = \frac{\log_7(2x^2+5)}{(x-4)^2}$	20.22	$y = \frac{2\ln(3x-10)}{(x+5)^7}$
20.23	$y = \frac{2\log_3(4x-7)}{(x+3)^4}$	20.24	$y = \frac{8\lg(4x+5)}{(x-1)^5}$
20.25	$y = \frac{3\log_4(2x+9)}{(x-7)^2}$	20.26	$y = \frac{\lg(x^2-2x)}{(x+8)^4}$
20.27	$y = \frac{3\ln(x^2+5)}{(x-7)^3}$	20.28	$y = \frac{4\log_2(3x-5)}{(x-2)^2}$
20.29	$y = \frac{2\ln(2x^2-3)}{(x-5)^5}$	20.30	$y = \frac{4\lg(3x+7)}{(x-7)^3}$

Задание № 21

Найдите производные данных функций

21.1	$y = \sqrt{\frac{2x+1}{2x-1}}\log_2(x-3x^2)$	21.2	$y = \sqrt[3]{\frac{2x-5}{2x+3}}\lg(4x+7)$
21.3	$y = \sqrt[4]{\frac{x+3}{x-3}}\ln(5x^2-2x+1)$	21.4	$y = \sqrt[5]{\frac{x+1}{x-1}}\log_3(x^2+2+4)$
21.5	$y = \sqrt[6]{\frac{7x-4}{7x+4}}\log_5(3x^2+2x)$	21.6	$y = \sqrt[7]{\frac{2x-3}{2x+1}}\lg(7x-10)$
21.7	$y = \sqrt[8]{\frac{5x+1}{5x-1}}\ln(3x-x^2)$	21.8	$y = \sqrt[9]{\frac{x+3}{x-3}}\log_5(2x-3)$
21.9	$y = \sqrt{\frac{6x+5}{6x-5}}\lg(4x+7)$	21.10	$y = \sqrt[3]{\frac{4x-1}{4x+1}}\ln(2x^3-3)$
21.11	$y = \sqrt[4]{\frac{x+6}{x-6}}\sin(3x^2+1)$	21.12	$y = \sqrt[5]{\frac{x-7}{x+7}}\cos(2x^3+x)$
21.13	$y = \sqrt[6]{\frac{x-9}{x+9}}\,tg(3x^2-4x+1)$	21.14	$y = \sqrt[7]{\frac{x-4}{x+4}}\,ctg(2x+5)$
21.15	$y = \sqrt[8]{\frac{x-2}{x+2}}\sin(4x^2-7x+2)$	21.16	$y = \sqrt[9]{\frac{x+3}{x-3}}\cos(x^2-3x+2)$
21.17	$y = \sqrt{\frac{3x-2}{3x+2}}\,tg(2x^2-9)$	21.18	$y = \sqrt{\frac{2x+3}{2x-3}}\,ctg(3x^2+5)$
21.19	$y = \sqrt[4]{\frac{x+5}{x-5}}\sin(3x^2-x+4)$	21.20	$y = \sqrt[5]{\frac{x-6}{x+6}}\cos(7x+2)$
21.21	$y = \sqrt[6]{\frac{x-7}{x+7}}\arcsin(2x+3)$	21.22	$y = \sqrt[7]{\frac{x-8}{x+8}}\arccos(3x-5)$
21.23	$y = \sqrt[8]{\frac{x-4}{x+4}}\,arctg(5x+1)$	21.24	$y = \sqrt[9]{\frac{x-1}{x+1}}\,arcctg(7x+2)$
21.25	$y = \sqrt{\frac{7x-4}{7x+4}}\arcsin(x^2+1)$	21.26	$y = \sqrt[3]{\frac{8x-3}{8x+3}}\arccos(x^2-5)$
21.27	$y = \sqrt[4]{\frac{2x-5}{2x+5}}\,arctg(3x+2)$	21.28	$y = \sqrt[5]{\frac{3x-4}{3x+4}}\,arcctg(2x+5)$
21.29	$y = \sqrt[6]{\frac{x^2-1}{x^2+1}}\arcsin 2x$	21.30	$y = \sqrt[7]{\frac{x^2+3}{x^2-3}}\arccos 4x$

Задание № 22

Найдите производные данных функций

22.1	$y = (\arccos(x+2))^{tg3x}$	22.2	$y = (\arcsin 2x)^{ctg(x+1)}$
22.3	$y = (arctg(x+7))^{\cos 2x}$	22.4	$y = (arcctg(x-3))^{\sin 4x}$
22.5	$y = (ctg(3x-2))^{\arcsin 3x}$	22.6	$y = (tg(4x-3))^{\arcsin 3x}$
22.7	$y = (\cos(2x-5))^{arctg5x}$	22.8	$y = (\sin(7x+4))^{arcctgx}$
22.9	$y = (\arcsin 2x)^{\ln(x+3)}$	22.10	$y = (\arccos 3x)^{\lg(5x-1)}$
22.11	$y = (arctg5x)^{\log_2(x+4)}$	22.12	$y = (arctg7x)^{\lg(x+1)}$
22.13	$y = (\log_4(2x+3))^{\arcsin x}$	22.14	$y = (\log_5(3x+2))^{\arccos x}$
22.15	$y = (\ln(5x-4))^{arcctgx}$	22.16	$y = (\log_2(6x+5))^{\arcsin 2x}$
22.17	$y = (\lg(7x-5))^{arctg2x}$	22.18	$y = (\lg(4x-3))^{\arccos 4x}$
22.19	$y = (\ln(7x-3))^{arctg5x}$	22.20	$y = (\log_5(2x+5))^{arctgx}$
22.21	$y = (\sin(8x-7))^{cth(x+3)}$	22.22	$y = (\cos(3x+8))^{th(x-7)}$
22.23	$y = (tg(9x+2))^{ch(2x-1)}$	22.24	$y = (ctg(7x+5))^{sh3x}$
22.25	$y = (sh(3x-7))^{\cos(x+4)}$	22.26	$y = (ch(2x-3))^{tg(x+5)}$
22.27	$y = (th(7x-5))^{\sin(x+2)}$	22.28	$y = (ch(3x+2))^{\cos(x+4)}$
22.29	$y = (\ln(7x+4))^{tgx}$	22.30	$y = (\lg(8x+3))^{tg5x}$

Задание № 23

Найдите производные данных функций

23.1	$y = \dfrac{\sqrt{x+7}(x-3)^4}{(x+2)^5}$	23.2	$y = \dfrac{(x-3)^5(x+2)^3}{\sqrt{(x-1)^3}}$
23.3	$y = \dfrac{(x-2)^3\sqrt{(x+1)^5}}{(x-4)^2}$	23.4	$y = \dfrac{(x+1)^3\sqrt[5]{(x-2)^2}}{(x+1)^7}$

23.5	$y=\dfrac{(x+2)^7(x-3)^3}{\sqrt[3]{(x-4)^2}}$	23.6	$y=\dfrac{(x-1)^4(x+2)^5}{\sqrt[3]{(x-4)^2}}$
23.7	$y=\dfrac{(x-7)^{10}\sqrt{3x-1}}{(x+3)^5}$	23.8	$y=\dfrac{(x-3)^2\sqrt{x+4}}{(x+2)^7}$
23.9	$y=\dfrac{(x+1)^8(x-3)^2}{\sqrt{(x+2)^5}}$	23.10	$y=\dfrac{(x+2)(x-7)^4}{\sqrt[3]{(x-1)^4}}$
23.11	$y=\dfrac{\sqrt[5]{(x+4)^3}}{(x-1)^2(x+3)^5}$	23.12	$y=\dfrac{\sqrt[3]{(x-1)^7}}{(x+1)^5(x-7)^3}$
23.13	$y=\dfrac{\sqrt{(x+2)^3}(x-1)^4}{(x+2)^7}$	23.14	$y=\dfrac{\sqrt[3]{(x-2)^5}(x+3)^2}{(x-7)^3}$
23.15	$y=\dfrac{\sqrt[4]{x-8}(x+2)^6}{(x-1)^5}$	23.16	$y=\dfrac{\sqrt[5]{x+1}(x-3)^7}{(x+8)^3}$
23.17	$y=\dfrac{\sqrt[7]{(x-2)^4}}{(x+1)^2(x-6)^5}$	23.18	$y=\dfrac{\sqrt[5]{(x+1)^2}}{(x-3)^4(x-5)^3}$
23.19	$y=\dfrac{\sqrt{x^2+2x-3}}{(x+3)^7(x-4)^2}$	23.20	$y=\dfrac{\sqrt[3]{(x-2)^4}}{(x-5)^3(x+1)^7}$
23.21	$y=\dfrac{(x+4)^3(x-2)^4}{\sqrt[3]{(x-2)^5}}$	23.22	$y=\dfrac{(x-1)^6(x+2)^3}{\sqrt[5]{(x+3)^2}}$
23.23	$y=\dfrac{(x-1)^4(x-7)^2}{\sqrt{(x+2)^5}}$	23.24	$y=\dfrac{(x+7)^2(x-3)^5}{\sqrt{x^2+3x-1}}$
23.25	$y=\dfrac{\sqrt[3]{x-3}(x+7)^5}{(x-4)^4}$	23.26	$y=\dfrac{\sqrt{x+10}(x-8)^3}{(x-1)^5}$
23.27	$y=\dfrac{\sqrt[5]{(x-2)^3}(x-1)}{(x+3)^4}$	23.28	$y=\dfrac{\sqrt[4]{(x+1)^3}(x-2)^5}{(x-3)^2}$
23.29	$y=\dfrac{\sqrt[6]{(x-1)^5}}{(x+2)^4(x-5)^7}$	23.30	$y=\dfrac{\sqrt[5]{(x+2)^3}}{(x-1)^4(x-3)^5}$

Задание № 24

Найдите производные данных функций

24.1	$y = \sqrt{x}\ln\left(\sqrt{x} + \sqrt{x + a}\right) - x$	24.2	$y = \ln\left(x + \sqrt{x^2 + a^2}\right)$
24.3	$y = 2\sqrt{x} - 4\ln\left(2 + \sqrt{x}\right)$	24.4	$y = \ln\left(\sqrt{x} + \sqrt{x + 1}\right)$
24.5	$y = \ln\dfrac{a^2 + x^2}{a^2 - x^2}$	24.6	$y = \ln\dfrac{x^2}{\sqrt{1 - ax^4}}$
24.7	$y = \ln^2(x + \cos x)$	24.8	$y = \ln^3(1 + \cos x)$
24.9	$y = \ln\dfrac{x^2}{1 - x^2}$	24.10	$y = \ln tg\left(\dfrac{p}{4} + \dfrac{x}{2}\right)$
24.11	$y = \ln\sqrt[4]{\dfrac{1 + 2x}{1 - 2x}}$	24.12	$y = x + \dfrac{1}{\sqrt{2}}\ln\left(\dfrac{x - \sqrt{2}}{x + \sqrt{2}}\right) + a^{p^{\sqrt{2}}}$
24.13	$y = \ln\sin\dfrac{2x + 4}{x + 1}$	24.14	$y = \ln\cos\dfrac{2x + 3}{2x + 1}$
24.15	$y = \log_4\log_2 tgx$	24.16	$y = x(\cos x\ln x + \sin\ln x)/2$
24.17	$y = \log_{16}\log_5 tgx$	24.18	$y = \lg\ln ctgx$
24.19	$y = \log_a\dfrac{1}{\sqrt{1 - x^4}}$	24.20	$y = \dfrac{1}{\sqrt{2}}\ln\left(\sqrt{2}tgx + \sqrt{1 + tg^2 x}\right)$
24.21	$y = \ln\arcsin\sqrt{1 - e^{2x}}$	24.22	$y = \ln\arccos\sqrt{1 - e^{4x}}$
24.23	$y = \ln\left(bx + \sqrt{a^2 + b^2x^2}\right)$	24.24	$y = \ln\left(e^x + \sqrt{1 + e^{2x}}\right)$
24.25	$y = \ln\left(\arccos\dfrac{1}{\sqrt{x}}\right)$	24.26	$y = \ln\dfrac{\sqrt{x^2 + 1} + x\sqrt{2}}{\sqrt{x^2 + 1} - x\sqrt{2}}$
24.27	$y = \ln\dfrac{\sqrt{5} + tg(x/2)}{\sqrt{5} - tg(x/2)}$	24.28	$y = \ln\dfrac{\ln x}{\sin(1/x)}$
24.29	$y = \ln\ln\sin(1 + 1/x)$	24.30	$y = \ln\ln^3\ln^2 x$

Задание № 25

Найдите производные данных функций

25.1	$y = \frac{2\sqrt{1-x}\arcsin\sqrt{x}}{x} + \frac{2}{\sqrt{x}}$	25.2	$y = arctg\frac{tgx - ctgx}{\sqrt{2}} + \sqrt{6x^3}$
25.3	$y = \arcsin\frac{\sqrt{x}-2}{\sqrt{5x}} - \sqrt[4]{x^3}$	25.4	$y = \frac{2x-1}{4}\sqrt{2+x-x^2}$
25.5	$y = arctg\frac{\sqrt{1+x^2}-1}{x}$	25.6	$y = \arccos\frac{x^2-4}{\sqrt{x^4+16}}$
25.7	$y = \sqrt{\frac{2}{3}}arctg\frac{3x-1}{\sqrt{6x}}$	25.8	$y = \frac{1}{4}\ln\frac{x-1}{x+1} - \frac{1}{2}arctgx$
25.9	$y = \frac{x-4}{\sqrt{8x-x^2+7}} - ctg\frac{x-1}{2}$	25.10	$y = \frac{arcctg\sqrt{x}}{x^2} + \frac{1}{3x\sqrt{x}}$
25.11	$y = \frac{x^3}{3}\arccos x + \frac{2+x^2}{\sqrt{1-x^2}}$	25.12	$y = \frac{x}{2\sqrt{x}+1} + \frac{1+x}{2x}arctg\sqrt{x}$
25.13	$y = \frac{3+x}{\sqrt{x(x+2)}} + 3\arccos\sqrt{\frac{x}{2}}$	25.14	$y = \frac{4+x^4}{x^3}arctg\frac{x^2}{2} + \frac{4}{x}$
25.15	$y = \arcsin\sqrt{\frac{x}{x+1}} + arctg\sqrt{x}$	25.16	$y = \frac{1}{2}\sqrt{\frac{1}{x^2}-1} - \frac{\arccos x}{2x^2}$
25.17	$y = 6\arcsin\frac{\sqrt{x}}{2} - \frac{6+x}{2\sqrt{x}}$	25.18	$y = \frac{x-3}{\sqrt{6x-x^2}} + \arcsin\sqrt{\frac{x}{2}-1}$
25.19	$y = \frac{(1+x)arctg\sqrt{x} - \sqrt{x}}{x}$	25.20	$y = \frac{2x-5}{\sqrt{5x-x^2}} + \arcsin\sqrt{\frac{x-1}{3}}$
25.21	$y = arctg\frac{x}{3} + \frac{5}{6}\ln\frac{x^2+1}{x^2+4}$	25.22	$y = \arcsin\frac{3x-5}{(x-1)\sqrt{5}}$
25.23	$y = \sqrt{1-x^2} - \frac{x}{3}\arcsin\sqrt{1-x^2}$	25.24	$y = arcctg\frac{\sqrt{x}}{3} - \frac{8}{3}arctg\frac{2}{\sqrt{x}}$
25.25	$y = arctg\frac{\sqrt{1-x}}{1-\sqrt{x}} + ctg\frac{x}{3}$	25.26	$y = (2x^2+5x)arctg\frac{x+1}{x+2} - x$

5.27	$y = \frac{x \arcsin 2x}{2\sqrt{1 - 4x^2}} + \frac{1}{8}\ln(1 - 4x^2)$	5.28	$y = (x^2 - 1)arctg\frac{x^2 - 1}{x\sqrt{3}} - e^{\sqrt{x}}$
5.29	$y = 2x\, arcctg\frac{\sqrt{x}}{\sqrt{x} + 2} - \sqrt[3]{3x}$	5.30	$y = -x^2 \arccos\frac{x\sqrt{2}}{1 + x} - \sqrt{2}\ln x$

Задание № 26

Найдите производные данных функций

26.1	$y = \frac{1}{4\sqrt{5}}\ln\frac{2 + \sqrt{5}\,thx}{2 - \sqrt{5}\,thx}$	26.2	$y = \frac{shx}{4ch^4x} + \frac{3}{8}arctg\, shx$
26.3	$y = \frac{1}{2}\ln\frac{1 + \sqrt{thx}}{1 - \sqrt{thx}} - arctg\sqrt{thx}$	26.4	$y = \ln\frac{\sqrt{2} + thx}{\sqrt{2} - thx} - \frac{thx}{4(2 - th^2x)}$
26.5	$y = \frac{1}{2}thx + \frac{1}{4\sqrt{2}}\frac{1 + \sqrt{2}\,thx}{1 - \sqrt{2}\,thx}$	26.6	$y = -\frac{1}{2}\ln th\frac{x}{2} - \frac{chx}{2sh^2x}$
26.7	$y = \frac{2\ln ch\sqrt{5x}}{sh^3x} - \arcsin cthx$	26.8	$y = \frac{\sqrt{3}arctg\, thx}{\ln sh^2x} - sh^2 2x$
26.9	$y = arctg\frac{\sqrt{shx}}{chx - shx}$	26.10	$y = \frac{1}{6}\ln\frac{1 - shx}{2 + shx}$
26.11	$y = \sqrt[4]{\frac{1 + thx}{1 - thx}}$	26.12	$y = \frac{\sqrt{7}\,sh^3x}{1 + chx}$
26.13	$y = \frac{ch^5 3x}{\sqrt{shx}}$	26.14	$y = \frac{\sqrt{3}\,th^3x}{\sqrt{ch6x}}$
26.15	$y = \frac{1 + 8ch^2x\ln chx}{2ch^2x}$	26.16	$y = -\frac{12sh^2x + 1}{3sh^3x}$
26.17	$y = -\frac{shx}{2ch^2x} + \frac{3}{2}\arcsin(thx)$	26.18	$y = \frac{1}{\sqrt{8}}\arcsin\frac{3 + chx}{1 + 3chx}$
26.19	$y = \frac{1}{\sqrt{8}}\ln\frac{4 + \sqrt{8}\,th(x/2)}{4 - \sqrt{8}\,th(x/2)}$	26.20	$y = \frac{1}{4}\ln th\frac{x}{2} - \frac{1}{4}\ln\frac{3 + chx}{shx}$

26.21	$y = -\frac{1}{4}\arcsin\frac{5+3chx}{3+5chx}$	26.22	$y = \frac{1-8ch^2x}{4ch^4x}$
26.23	$y = \frac{2}{shx} - \frac{shx}{2ch^2x} + \frac{5}{2}arctgshx$	26.24	$y = \frac{8}{3}cth2x - \frac{1}{3chx\,sh^3x}$
26.25	$y = \frac{1}{2}arctg(shx) - \frac{shx}{2ch^3x}$	26.26	$y = \frac{3}{2}\ln th\frac{x}{2} + chx - \frac{chx}{sh^2x}$
26.27	$y = \frac{shx}{2ch^2x} - \frac{1}{shx} - \frac{3}{2}arctgshx$	26.28	$y = \frac{shx}{2\sqrt{chx}} + \frac{1}{2}arcctg(shx)$
26.29	$y = \frac{1-2shx}{(1+chx)^2} + \sin^2 shx$	26.30	$y = \frac{3}{2}\cos^3(ch^2x) + \frac{1}{2}\ln thx^2$

Задание № 27

Найдите производные данных функций

27.1	$y = (arctgx)^{(1/2)\ln arctgx}$	27.2	$y = \left(\sin\sqrt{x}\right)^{\ln\sin\sqrt{x}}$
27.3	$y = (\sin x)^{5e^x}$	27.4	$y = (\arcsin x)^{e^x}$
27.5	$y = (\ln x)^{3^x}$	27.6	$y = x^{\arcsin x}$
27.7	$y = (ctg3x)^{2e^x}$	27.8	$y = x^{e^{tgx}}$
27.9	$y = (tgx)^{4e^x}$	27.10	$y = (\cos 5x)^{e^x}$
27.11	$y = (x\sin x)^{8\ln(x\sin x)}$	27.12	$y = (x-5)^{ch\,x}$
27.13	$y = \left(x^3+4\right)^{tgx}$	27.14	$y = (x+1)^{\sin x^3}$
27.15	$y = \left(x^2-1\right)^{sh\,x}$	27.16	$y = \left(x^4+5\right)^{ctg\,x}$
27.17	$y = (\sin x)^{5^{x/2}}$	27.18	$y = \left(x^2+1\right)^{\cos x}$