Pirmais laboratorijas darbs par vienargumenta funkcijas atvasinājumu un diferenciāli

1.uzdevums. Uzrakstīt funkcijas pieaugumu dotajām x vērībām un dotajām Δx vērtībām! Attēlot grafiski! Dotajam piemēram atrast atvasinājumu pēc definīcijas un aprēķināt to dotajos punktos!

2.uzdevums. Izmantojot definīciju atrast dotās funkcijas atvasinājumu $f'(0)$!

3.uzdevums. Izpētīt funkcijas nepārtauktību un diferencējamību!

4.uzdevums. Atrast doto funkciju atvasinājumu!

1. variants.

1. uzdevums.

$f(x) = x^2,\ x_0 = -1,\ \Delta x = -0,2.$

2.uzdevums.

$f(x) = \begin{cases} tg\left(x^3 + x^2 \sin\frac{2}{x}\right),\ x \neq 0, \\ 0,\ x = 0. \end{cases}$

3. uzdevums.

$f(x) = \left|\frac{x}{2}\right|.$

4. uzdevums.

1. $y = (2 - x^3)^4$
2. $y = \left(2 - \frac{1}{x^3}\right)^{-2}$
3. $y = \sqrt[3]{(x+1)^2}$
4. $y = \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^{10}$
5. $y = \sin 2x + 2\cos^2 x$
6. $y = e^{ax} \cdot \frac{2}{\operatorname{arctg} 2x}$
7. $y = \ln \frac{\sqrt{1+x} - \sqrt{1-x}}{\sqrt{1+x} + \sqrt{1-x}}$
8. $y = \cos x a^{\sqrt{\cos x}}$
9. $y = \left(\arccos \frac{1}{1+x}\right)^3$
10. $y = \left(1 + \frac{1}{x}\right)^x$
11. $y = 5^{\operatorname{arctg}(x^2+5x)}$
12. $y = \sqrt{\alpha \sin^2 x + \beta \cos^2 x}$

2. variants.

1. uzdevums.

$f(x) = x^3,\ x_0 = -1,\ \Delta x = 0,1.$

2.uzdevums.

$f(x) = \begin{cases} \arcsin\left(x^2 \cos\frac{1}{9x}\right) + \frac{2}{3}x,\ x \neq 0, \\ 0,\ x = 0. \end{cases}$

3. uzdevums.

$f(x) = |2x|.$

4. uzdevums.

1. $y = x^2 + a^2 x + a$
2. $y = (a^3 x + 2a)^{-1}$
3. $y = \sqrt[3]{x^2} + \frac{1}{\sqrt{x}}$
4. $y = x\sqrt{1 + \frac{1}{x^2}}$
5. $y = \sin^2 \frac{x}{2} + 2\operatorname{tg} x$
6. $y = \frac{e^x}{\sqrt{\operatorname{arctg} 2x + 1}}$
7. $y = \ln \frac{1 + \operatorname{tg}\frac{x}{2}}{1 - \operatorname{tg}\frac{x}{2}}$
8. $y = 2x \cdot \operatorname{arctg}\sqrt{\sin x}$
9. $y = e^{-x^2} \cos e^{-2x}$
10. $y = x^{\cos x}$
11. $y = \sqrt{e^{2x} + \ln(\cos 6x)}$
12. $y = \lg(\sin x + \sqrt[3]{x})$

3. variants.

1. uzdevums.

$f(x) = x^4,\ x_0 = 0,\ \Delta x = -0,2.$

2.uzdevums.

$$f(x) = \begin{cases} \operatorname{arctg}\left(x \cos \frac{1}{5x}\right), & x \neq 0, \\ 0, & x = 0. \end{cases}$$

3. uzdevums.

$f(x) = |x - 2|.$

4. uzdevums.

1. $y = x^4 - 2ax + a^2$
2. $y = (x + 15)^{-10}$
3. $y = \frac{1}{\sqrt[3]{x^2}} + \sqrt{x}$
4. $y = x \cdot \sqrt{1 + \frac{x+1}{x+2}}$
5. $y = \sin x - \operatorname{tg}^2\left(\frac{x}{2}\right)$
6. $y = \sqrt{\operatorname{arctg} x} - (\arcsin x)^3$
7. $y = \ln(x \sin x)$
8. $y = \ln\left(\frac{1+\sqrt{\sin x}}{1-\sqrt{sinx}}\right)$
9. $y = \sin x \cos(\sin x)$
10. $y = x^{\sin x}$
11. $y = \operatorname{tg}\left(\arcsin \sqrt{\frac{x}{\sin x}}\right)$
12. $y = 3^{-\frac{\sin x}{\ln x}}$

4. variants.

1. uzdevums.

$f(x) = 2^x,\ x_0 = 0,\ \Delta x = 0,1.$

2.uzdevums.

$$f(x) = \begin{cases} \ln\left(1 - \sin\left(x^3 \sin \frac{1}{x}\right)\right), & x \neq 0, \\ 0, & x = 0. \end{cases}$$

3. uzdevums.

$f(x) = |2x + 1|.$

4. uzdevums.

1. $y = (2 - 3x^3)^3$
2. $y = \left(2 - \frac{3}{x^3}\right)^{-3}$
3. $y = 2\sqrt[4]{x} - \frac{1}{\sqrt[3]{x}}$
4. $y = \frac{x}{\sqrt{1-\frac{2}{x^2}}}$
5. $y = \sin \sqrt{x} + \operatorname{ctg} 2x$
6. $y = \frac{\operatorname{arctg}(x+1)^{\frac{4}{3}}}{a^{(x+1)^2}}$
7. $y = \ln \sqrt{1 - x^2}$
8. $y = \operatorname{arctg} \ln \frac{1}{x}$
9. $y = \sqrt{\sin \sqrt{1 + x^2}}$
10. $y = \left(\frac{x}{x+1}\right)^x$
11. $y = 5 \cdot \operatorname{ctg}\ e^{\sqrt{6-\operatorname{tg}^3 x}}$
12. $y = 5^{\sqrt{\operatorname{arctg} x^2}}$

5. variants.

1. uzdevums.

$f(x) = \left(\frac{1}{2}\right)^x,\ x_0 = 2,\ \Delta x = -0,2.$

2.uzdevums.

$$f(x) = \begin{cases} \sin\left(x \sin \frac{3}{x}\right),\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$f(x) = \operatorname{sgn}(x-1).$

4. uzdevums.

1. $y = (1-x^2)^5$
2. $y = (3x+5)^{-5}$
3. $y = \frac{2}{\sqrt[4]{x}} - \sqrt[3]{x}$
4. $y = \frac{x}{\sqrt{1+2x^2}}$
5. $y = \cos(x+1)^2 + \frac{1}{3}\operatorname{ctg} x$
6. $y = a^{x^2} \cdot \operatorname{arctg}(x-1)^{\frac{3}{2}}$
7. $y = \ln(2e^x + \sqrt{x})$
8. $y = \operatorname{arctg} \ln x$
9. $y = \sin\left(\cos \frac{1}{x}\right)$
10. $y = (\cos x)^{\sin x}$
11. $y = \ln 10^{\operatorname{arctg}\sqrt{x}}$
12. $y = \frac{1}{2} \cdot \frac{(\arcsin x)^2}{\arccos \sqrt{4-x^2}}$

6. variants.

1. uzdevums.

$f(x) = 10^x,\ x_0 = 2,\ \Delta x = 0,1.$

2.uzdevums.

$$f(x) = \begin{cases} x^2 \cos \frac{4}{3x} + \frac{x^2}{2},\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$f(x) = \operatorname{sgn}(2-x).$

4. uzdevums.

1. $y = (1-x^2)^2$
2. $y = \left(1 - \frac{1}{x^2}\right)^2$
3. $y = (\sqrt{x} + \sqrt[3]{x})^2$
4. $y = \sqrt{1 + \frac{1}{x}} \cdot \frac{1}{x}$
5. $y = \cos 2(x-1) - 2\cos(x-1)$
6. $y = a^{2x} \cdot \operatorname{arctg}\sqrt{2x}$
7. $y = \ln(e^x \cos x)$
8. $y = 3^{\frac{\sin ax}{\cos ax}}$
9. $y = \frac{1}{m\sqrt{ab}} \operatorname{arctg}\left(e^{mx}\sqrt{\frac{a}{b}}\right)$
10. $y = x^{\sin(x+1)}$
11. $y = \sqrt[3]{\cos\sqrt{\frac{x}{\operatorname{tg}^2 x}}}$
12. $y = \sqrt[3]{\frac{x-5}{\sqrt[5]{x^2+4}}}$

7. variants.

1. uzdevums.

$f(x) = 10^{-x},\ x_0 = -1,\ \Delta x = -0,2.$

2.uzdevums.

$$f(x) = \begin{cases} \sin x \cos \frac{5}{x},\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$$f(x) = \begin{cases} x,\ x \geq 1, \\ x^2,\ x < 1. \end{cases}$$

4. uzdevums.

1. $y = (3x + 5)^{10}$
2. $y = (5x + 3)^{-10}$
3. $y = \left(\frac{1}{\sqrt{x}} + 3\sqrt[3]{x}\right)^2$
4. $y = x \cdot \sqrt[3]{1 + \sqrt{x}}$
5. $y = \sqrt{\sin 2x} + \cos^2 x$
6. $y = \sqrt{\frac{\arcsin 2x}{e^x}}$
7. $y = \ln\left(x + \sqrt{a^2 + x^2}\right)$
8. $y = x \cdot \sin\left(\ln x - \frac{\pi}{4}\right)$
9. $y = -\sqrt{2} \cdot \operatorname{arcctg}\left(\frac{\operatorname{tg} x}{\sqrt{2}}\right) - x$
10. $y = x^{\frac{1}{x}}$
11. $y = \sqrt[4]{\frac{1 - \sin^2 2x}{1 + \sin^2 4x}}$
12. $y = \ln \arcsin x + \arcsin \ln x$

8. variants.

1. uzdevums.

$f(x) = x^2,\ x_0 = -1,\ \Delta x = 0,1.$

2.uzdevums.

$$f(x) = \begin{cases} \operatorname{arctg} x \sin \frac{7}{x},\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$$f(x) = \begin{cases} x,\ x \leq 1, \\ x^2,\ x > 1. \end{cases}$$

4. uzdevums.

1. $y = (2x - 1)^3$
2. $y = \left(\frac{2}{x} - 1\right)^3$
3. $y = \left(\sqrt{x} + \frac{1}{\sqrt[3]{x}}\right)^2$
4. $y = x \cdot \sqrt[3]{1 + x^3}$
5. $y = \sin 2x - \sqrt[3]{\cos^2 x}$
6. $y = \sqrt{\frac{e^x}{\arcsin \frac{x}{2}}}$
7. $y = \ln(x - \cos x)$
8. $y = 3 \cdot \operatorname{ctg} \frac{1}{x}$
9. $y = \ln(\arcsin 5x)$
10. $y = (\ln x)^x$
11. $y = 2^{\arcsin 3x} + (1 - \arccos 3x)^2$
12. $y = \frac{\sqrt{3}}{6} \cdot \operatorname{arcctg} \sqrt{e^{3x}}$

9. variants.

1. uzdevums.

$f(x) = x^3,\ x_0 = 0,\ \Delta x = -0,2.$

2.uzdevums.

$$f(x) = \begin{cases} 2x^2 + x^2 \cos \frac{5}{x},\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$$f(x) = \begin{cases} x,\ x^2 \leq 1, \\ x^2,\ x^2 > 1. \end{cases}$$

4. uzdevums.

1. $y = \frac{x^6}{6} + 7x^2 - x + a^4$
2. $y = \frac{1}{6x^6} + 7x62 - \frac{1}{x}$
3. $y = 2\sqrt{x} - \frac{x}{\sqrt[5]{x^2}}$
4. $y = \left(\frac{3x+2}{5}\right)^5$
5. $y = \text{tg}2x \cdot \sqrt[4]{\cos^2 x + 1}$
6. $y = \sqrt{e^x \arcsin \frac{x}{2}}$
7. $y = \ln \text{arctg} \frac{1}{1+x}$
8. $y = \frac{1}{\sqrt{x}} \cdot e^{x^2 - \text{arctg}x + \frac{1}{2}\ln x + 1}$
9. $y = \text{arctg} \frac{x \sin \alpha}{1 - x \cos \alpha}$
10. $y = (\sin x)^x$
11. $y = \ln(\ln(3 - 2\sqrt{x}))$
12. $y = \frac{1}{12} \ln \frac{(1+2x)^2}{\sin 4x}$

10. variants.

1. uzdevums.

$f(x) = x^4,\ x_0 = 0,\ \Delta x = 0,2.$

2.uzdevums.

$$f(x) = \begin{cases} x^2 \cos^2 \frac{11}{x},\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$$f(x) = \begin{cases} |x|, \|x| \leq 1, \\ x^2,\ |x| > 1. \end{cases}$$

4. uzdevums.

1. $y = x^5 - 4ax - 3 + a^4$
2. $y = \frac{1}{x^5} - \frac{4}{x^2} + 3x$
3. $y = \frac{2}{\sqrt{x}} - x\sqrt[5]{x^2}$
4. $y = x\sqrt{1 - x^2}$
5. $y = \frac{\text{tg}^2 x}{\sin x - \cos x}$
6. $y = e^{\sqrt{x}} \cdot \sqrt{\arcsin 2x}$
7. $y = \ln \frac{1 - e^x}{e^x}$
8. $y = \sqrt[5]{(1 + xe^{\sqrt{x}})^3}$
9. $y = \frac{2}{3}\text{arcctg} \frac{5\text{tg}\frac{x}{2} + 4}{3}$
10. $y = x^{\sqrt{x}}$
11. $y = \ln(\ln(\ln(\sqrt[3]{x} - \cos x)))$
12. $y = \arccos \frac{x^{2n} - 1}{2^n + 1}$

11. variants.

1. uzdevums.

$f(x) = 2^x,\ x_0 = 2,\ \Delta x = -0,2.$

2.uzdevums.

$$f(x) = \begin{cases} 6x + x\sin\frac{1}{x},\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$$f(x) = \begin{cases} \frac{1}{x},\ x \geq 1, \\ x,\ x < 1. \end{cases}$$

4. uzdevums.

1. $y = 7x^3 + \frac{1}{2}x^2 - 2x + 10$
2. $y = 7x^3 + \frac{1}{2x^3} - \frac{2}{x} + 10$
3. $y = \frac{2}{\sqrt{x}} - \frac{x}{\sqrt[5]{x^2}}$
4. $y = \left(\frac{2x-1}{3}\right)^5$
5. $y = \frac{1}{6(1-3\cos x)^2}$
6. $y = e^{\frac{x}{2}}\arccos(x-2)^2$
7. $y = \frac{1}{4}\ln\frac{1+x}{1-x}$
8. $y = \mathrm{ctg}x \cdot \ln(1+\sin x) - x$
9. $y = \frac{m}{2}\ln(x^2 - a^2) + \frac{n}{2a}\ln\frac{x-a}{x+a}$
10. $y = x^{(x^3)}$
11. $y = -\frac{1}{2\sin^2 x} + \ln \mathrm{tg}x$
12. $y = \frac{(1-x^2)e^{3x-1}\cdot\cos x}{(\arccos x)^3}$

12. variants.

1. uzdevums.

$f(x) = 2^{-x},\ x_0 = 2,\ \Delta x = 0,1.$

2.uzdevums.

$$f(x) = \begin{cases} \frac{\ln\cos x}{x},\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$$f(x) = \begin{cases} \lg x,\ x \geq 1, \\ x^2,\ x < 1. \end{cases}$$

4. uzdevums.

1. $y = 5x^4 - 3x^2 + x - 1$
2. $y = \frac{5}{x^7} - \frac{3}{x^2} - \frac{1}{x} - 1$
3. $y = (1 + \sqrt[3]{x})^3$
4. $y = \left(\frac{x+2}{3}\right)^5$
5. $y = \frac{\sin 3x}{2\sin^2 x \cdot \cos x}$
6. $y = e^{2x}\arccos^2 x$
7. $y = \ln\frac{x+\sqrt{1-x^2}}{x}$
8. $y = \frac{1}{\cos(x-\cos x)}$
9. $y = \mathrm{arctg}e^{2x} + \ln\sqrt{\frac{e^{2x}}{e^{2x}-1}}$
10. $y = (\mathrm{tg}2x)^{\mathrm{ctg}\frac{x}{2}}$
11. $y = \arcsin(\ln\sqrt{x})$
12. $y = \ln\cos\mathrm{arctg}\frac{e^x - e^{-x}}{2}$

13. variants.

1. uzdevums.

$f(x) = x^3,\ x_0 = 1,\ \Delta x = -0,2.$

2.uzdevums.

$$f(x) = \begin{cases} \frac{e^{x^2}-\cos x}{x},\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$$f(x) = \begin{cases} |x|,\ x \leq 1, \\ x^2,\ x > 1. \end{cases}$$

4. uzdevums.

1. $y = (3x^2 - 5)^2$
2. $y = \left(2 - \frac{3}{x^3}\right)^{-3}$
3. $y = 2\sqrt[4]{x} - \frac{1}{\sqrt[3]{x}}$
4. $y = \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^{10}$
5. $y = \frac{\mathrm{tg}^2 x}{\cos x - \sin x}$
6. $y = e^{\frac{x}{2}} \cdot \arccos(x-2)^2$
7. $y = \frac{1}{4} \ln \frac{1+x}{1-x}$
8. $y = \mathrm{ctg}x \cdot \ln(1 + sinx) - x$
9. $y = \left(\arccos \frac{1}{x+1}\right)^5$
10. $y = x^{\sin(x+1)}$
11. $y = \sqrt[4]{\frac{1-\sin^2 x}{1+\cos^2 2x}}$
12. $y = \sqrt{\alpha \sin^2 x + \beta \cos^2 x}$

14. variants.

1. uzdevums.

$f(x) = \sin x,\ x_0 = \frac{\pi}{3},\ \Delta x = -0,2.$

2.uzdevums.

$$f(x) = \begin{cases} e^{x \sin 5x} - 1,\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$$f(x) = \begin{cases} x^4,\ x \leq 1, \\ x^2,\ x > 1. \end{cases}$$

4. uzdevums.

1. $y = x^7 - 5xb - 7 + b^3$
2. $y = \frac{3}{(x-3)^2}$
3. $y = \frac{3}{\sqrt[3]{x}} - \sqrt[5]{x}$
4. $y = x\sqrt{2 + \frac{1-x}{x+2}}$
5. $y = \frac{sin5x}{2\sin^2 x \cos x}$
6. $y = \sqrt{\mathrm{arctg}x} - (\arccos x)^2$
7. $y = \ln \frac{e^x}{1+e^x}$
8. $y = \sqrt[5]{(x + 2e^{\sqrt{x}})^2}$
9. $y = \cos x \cdot \sin(\cos x)$
10. $y = (\ln)^{x^2}$
11. $y = \ln(\ln(\ln \sqrt{x} - \sin x))$
12. $y = \sqrt[5]{\frac{x-3}{\sqrt[3]{x^2+3}}}$

15. variants.

1. uzdevums.

$f(x) = x^2,\ x_0 = -1,\ \Delta x = -0,2.$

2.uzdevums.

$$f(x) = \begin{cases} tg\left(x^3 + x^2 \sin\frac{2}{x}\right),\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$f(x) = \left|\frac{x}{2}\right|.$

4. uzdevums.

1. $y = (3 - x^2)^4$
2. $y = \left(\frac{4}{x} - 2\right)^3$
3. $y = 2\sqrt{x} - \frac{x}{\sqrt[4]{x^2}}$
4. $y = \frac{x}{\sqrt{1 - \frac{3}{x^3}}}$
5. $y = \frac{1}{4(1 - 2\sin x)^2}$
6. $y = e^{x^2} \cdot \arcsin^2 x$
7. $y = \ln \operatorname{arcctg} \frac{1}{x-2}$
8. $y = \frac{1}{\sqrt[3]{x^2}} \cdot e^{2x - \operatorname{arctg} x + \ln\sqrt{x}}$
9. $y = \sqrt{\cos(\sqrt[3]{3 + x^3})}$
10. $y = \left(\frac{x+1}{x-1}\right)^x$
11. $y = 3\operatorname{tg} e^{\sqrt{9 - \operatorname{ctg}^2}}$
12. $y = \frac{1}{3} \frac{(\arccos x)^3}{\arcsin\sqrt{9 - x^2}}$

16. variants.

1. uzdevums.

$f(x) = (x - 2)^2,\ x_0 = 1,\ \Delta x = -0,2.$

2.uzdevums.

$$f(x) = \begin{cases} e^{x \sin 5x} - 1,\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$f(x) = \left|\frac{x}{2} - 1\right|.$

4. uzdevums.

1. $y = (x^3 - 3)^4$
2. $y = \frac{1}{2x^4} + 7x^3 - \frac{1}{x}$
3. $y = \sqrt[5]{x^4} + \frac{1}{\sqrt{x}}$
4. $y = \frac{1}{x} \cdot \sqrt{7 + \frac{1}{x}}$
5. $y = \frac{(2x^2 - 1)\sqrt{1 + x^2}}{3x^3}$
6. $y = x - \ln(2 + e^x + 2\sqrt{e^{2x} + e^x + 1})$
7. $y = e^{\sin x}\left(x - \frac{1}{\cos x}\right)$
8. $y = \sin\sqrt{3}\frac{1}{3} \cdot \frac{\sin^2 3x}{\cos 6x}$
9. $y = \arcsin\frac{\sqrt{x} - 2}{\sqrt{5x}}$
10. $y = (\sin x)^{5e^x}$
11. $y = \frac{2}{x-1}\sqrt{2x - x^2} + \ln\frac{1 + \sqrt{2x - x^2}}{x-1}$
12. $y = x^3 \arcsin x + \frac{x^2 + 2}{3}\sqrt{1 - x^2}$

17. variants.

1. uzdevums.

$f(x) = 3^{-x},\ x_0 = -2,\ \Delta x = -0,2.$

2.uzdevums.

$$f(x) = \begin{cases} 3^{x^2 \sin \frac{2}{x}},\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$f(x) = |3x - 2|.$

4. uzdevums.

1. $y = 3x^4 + 4x^3 - 5x + 1$
2. $y = \frac{1}{x^6} + \frac{5}{x^3} - 8x^2$
3. $y = \frac{3}{\sqrt{x}} - x \cdot \sqrt[7]{x^5}$
4. $y = \frac{3x+\sqrt{x}}{\sqrt{x^2+2}}$
5. $y = -\frac{1}{2}e^{-x^2(x^4+2x^2+2)}$
6. $y = \ln \frac{\ln x}{\sin\left(\frac{1}{x}\right)}$
7. $y = \sin \sqrt[3]{\cos \sqrt{2}} - \frac{1}{48} \cdot \frac{\cos^2 24x}{\sin 48x}$
8. $y = \operatorname{arctg} \frac{\operatorname{tg}\left(\frac{x}{2}\right)+1}{2}$
9. $y = \frac{\operatorname{sh} x}{1+\operatorname{ch} x}$
10. $y = (x^8 + 1)^{\operatorname{th} x}$
11. $y = \frac{1}{x}\sqrt{1 - 4x^2} + \ln \frac{1+\sqrt{1-4x^2}}{2x}$
12. $y = \sqrt{x^3 + 3x} + 5 \arcsin \sqrt{\frac{x+2}{5}}$

18. variants.

1. uzdevums.

$f(x) = 7^x,\ x_0 = 1,\ \Delta x = 0,1.$

2.uzdevums.

$$f(x) = \begin{cases} \frac{\ln(1+2x^2+x^3)}{x},\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$$f(x) = \begin{cases} 2x - 1,\ x \leq 1, \\ x^2,\ x > 1. \end{cases}$$

4. uzdevums.

1. $y = (x^3 - 7)^5$
2. $y = x - \sqrt[4]{x^3}$
3. $y = \frac{3}{x} - \frac{x}{\sqrt[5]{x^3}}$
4. $y = \frac{(x^2+2)}{2\sqrt{1-x^4}}$
5. $y = \frac{e^{x^2}}{(1+x^2)}$
6. $y = \ln \arcsin \sqrt{1 - e^{2x}}$
7. $y = \operatorname{ctg} \cos 5 - \frac{1}{40} \cdot \frac{\cos 20}{\sin 40}$
8. $y = \sqrt{\frac{2}{3}} \operatorname{arctg} \frac{3x-1}{\sqrt{6x}}$
9. $y = \frac{\operatorname{sh} 3x}{\sqrt{\operatorname{ch} 6x}}$
10. $y = x^{2^x} \cdot 5^x$
11. $y = \ln(e^{3x} + \sqrt{e^{6x} - 1}) + \arcsin e^{-3x}$
12. $y = \operatorname{arctg} \sqrt{x^2 - 1} - \frac{\ln x}{\sqrt{x^2-1}}$

19. variants.

1. uzdevums.

$f(x) = (x-1)^3,\ x_0 = 0,\ \Delta x = -0,1.$

2.uzdevums.

$$f(x) = \begin{cases} \frac{\cos x - \cos 3x}{x},\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$$f(x) = \begin{cases} x^2,\ x \leq -1, \\ -3x - 2,\ x > -1. \end{cases}$$

4. uzdevums.

1. $y = (x^2 + x + 1)^2$
2. $y = \frac{2}{x^2} + \frac{3}{x^3} + \frac{4}{x^4}$
3. $y = 14\sqrt[3]{x} + \frac{28}{\sqrt{x}}$
4. $y = 3\frac{\sqrt[3]{x^2+x+1}}{x+1}$
5. $y = \frac{1}{2}\ln(e^{2x} + 1) + \operatorname{arctg} e^x$
6. $y = \lg \ln \operatorname{ctg} x$
7. $y = \frac{\cos \operatorname{tg}\left(\frac{1}{3}\right) \cdot \sin^2 15x}{15 \cos 10x}$
8. $y = \operatorname{arctg} \frac{\operatorname{tg} x - \operatorname{ctg} x}{\sqrt{2}}$
9. $y = \frac{1}{6}\ln \frac{1-\operatorname{sh} 2x}{2+\operatorname{sh} 2x}$
10. $y = (\cos 5x)^{e^x}$
11. $y = \frac{3}{2}\operatorname{arctg}\sqrt{x-1} + 3x\sqrt{x-1}$
12. $y = 3\frac{\sin x}{\cos^2 x} + 2\frac{\sin x}{\cos^4 x}$

20. variants.

1. uzdevums.

$f(x) = x^4,\ x_0 = 1,\ \Delta x = 0,1.$

2.uzdevums.

$$f(x) = \begin{cases} 1 - \cos\left(x \cdot \sin \frac{1}{x}\right),\ x \neq 0, \\ 0,\ x = 0. \end{cases}$$

3. uzdevums.

$$f(x) = \begin{cases} x^4,\ x \leq 0, \\ 3x,\ x > 0. \end{cases}$$

4. uzdevums.

1. $y = \frac{1}{5}x^5 + \frac{1}{3}x^3 + \frac{1}{2}x^2 + x + 1$
2. $y = \frac{1}{x^2} - \frac{3}{x^6} + 3$
3. $y = \frac{5}{3} \cdot \sqrt[5]{x^3} - \frac{7}{8} \cdot \frac{x}{\sqrt[7]{x^6}}$
4. $y = 2\sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}$
5. $y = \frac{1}{\ln 4}\ln \frac{1+2^x}{1-2^x}$
6. $y = \log_{16} \log_5 \operatorname{tg} x$
7. $y = \frac{\cos \sin 5 \cdot \sin^2 2x}{7 \cos 14x}$
8. $y = \arcsin \frac{\sqrt{x}-2}{\sqrt{5x}}$
9. $y = \frac{1}{4\sqrt{5}}\ln \frac{2+\sqrt{5}\operatorname{th} x}{2-\sqrt{5}\operatorname{th} x}$
10. $y = (\sin \sqrt{x})^{e^{\frac{1}{x}}}$
11. $y = \frac{1}{\sqrt{2}}\operatorname{arctg}\frac{2x+1}{\sqrt{2}} + \frac{2x+1}{4x^2+4x+3x}$
12. $y = \frac{\cos x}{\sin^2 x} - 2\cos x - 3\ln \operatorname{tg}\frac{x}{2}$