

# Дифференциальное исчисление

- 1 – 6. Найти производную  $dy/dx$  функции  $y(x)$ .
7. Найти первую и вторую производные  $dy/dx$  и  $d^2y/dx^2$ .
8. Найти дифференциал функции.
9. Найти производную указанного порядка.
10. Найти уравнения касательной и нормали к кривой в точке  $t = t_0$ .
11. Используя правило Лопиталя, вычислить пределы.
12. а) Найти интервалы монотонности и экстремум функции.  
б) На отрезке  $[a, b]$  найти наибольшее и наименьшее значения функции.
13. Найти асимптоты кривой.
14. Провести полное исследование функции и построить её график.

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1. $y(x) = \frac{2(3x^3 + 4x^2 - x - 2)}{15\sqrt{1+x}}$ .	2. $y(x) = x - \ln(2 + e^x + 2\sqrt{e^{2x} + e^x + 1})$ .
3. $y(x) = \sqrt{x} \cdot \ln(\sqrt{x} + \sqrt{x+a}) - \sqrt{x+a}$ .	4. $y(x) = \sin \sqrt{3} + \frac{1}{3} \frac{\sin^2 3x}{\cos 6x}$ .
5. $y(x) = \frac{x \cdot \arcsin x}{\sqrt{1-x^2}} + \ln \sqrt{1-x^2}$ .	6. $y(x) = \frac{1}{\sin \alpha} \ln(\operatorname{tg} x + \operatorname{ctg} \alpha)$ .
7. $x(t) = \frac{3t^2 + 1}{3t^3}, y(t) = \sin(t + \frac{1}{3}t^3)$ .	8. $y(x) = x \cdot \arcsin\left(\frac{1}{x}\right) + \ln(x + \sqrt{x^2 - 1}), x > 1$ .
9. $y(x) = (5x - 1)\ln^2 x, y'''(x) = ?$	10. $x(t) = a \cdot \sin^3 t, y(t) = a \cdot \cos^3 t; t_0 = \pi/3$ .
11. $\lim_{x \rightarrow \infty} (x - 2\operatorname{arctg} x) \ln x$ ; $\lim_{x \rightarrow \pi/2} (\sin x)^{\operatorname{tg} x}$ ; $\lim_{x \rightarrow 1} \frac{x^2 - x}{x^n - 1}$ .	
12. $y(x) = x^2 + \frac{16}{x} - 16, a = 1, b = 4$ .	13. $y(x) = \frac{x^3 - 2x^2 - 3x + 2}{1 - x^2}$ .
14. $y(x) = \frac{x^3 + 4}{x^2}$ .	

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1. $y(x) = \frac{(2x^2 - 1)\sqrt{1+x^2}}{3x^3}$ .	2. $y(x) = e^{2x}(2 - \sin 2x - \cos 2x)$ .
3. $y(x) = \cos \ln 2 - 0.5 \frac{\cos^2 3x}{\sin 6x}$ .	4. $y(x) = (\sin x)^{e^x}$ .
5. $y(x) = 4 \ln \frac{x}{1 + \sqrt{1 - 4x^2}}$ .	6. $y(x) = x \cdot \cos \alpha + \sin \alpha \cdot \ln \sin(x - \alpha)$ .
7. $x(t) = \sqrt{1 - t^2}, y(t) = \operatorname{tg} \sqrt{1 + t}$ .	8. $y(x) = \sqrt{1 + 2x} - \ln(x + \sqrt{1 + 2x})$ .
9. $y(x) = (x^2 + 3x + 1)e^{3x+2}, y'''(x) = ?$	10. $x(t) = a(t - \sin t), y(t) = a(1 - \cos t), t_0 = \pi/3$ .
11. $\lim_{x \rightarrow \infty} \frac{x^2 - 1}{2x^2 + 1}$ ; $\lim_{x \rightarrow \pi/2} \frac{\cos^2 x}{1 - \sin x}$ ; $\lim_{x \rightarrow 0} x \cdot \ln\left(\frac{1}{x}\right)$ .	
12. $y(x) = 2\sqrt{x} - x, a = 0; b = 4$ .	13. $y(x) = \frac{x^2 - 11}{4x - 3}$ .
14. $y(x) = x(12 - x^2)$ .	

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1. $y(x) = \frac{x^4 - 8x^2}{2(x^2 - 4)}$ .	2. $y(x) = 0.5 \cdot \operatorname{arctg} \frac{e^x - 3}{2}$ .
3. $y(x) = \operatorname{tg} \lg \frac{1}{3} + \frac{1}{4} \frac{\sin^2 4x}{\cos 8x}$ .	4. $y(x) = (\ln x)^{3x}$ .
5. $y(x) = x(2x^2 + 5) + 3 \ln(x + \sqrt{x^2 + 1})$ .	6. $y(x) = \operatorname{arctg} \cos \frac{x}{\sqrt[4]{\cos 2x}}$ .
7. $x(t) = \sqrt{2t - t^2}, y(t) = \frac{1}{\sqrt[3]{(1-t)^2}}$ .	8. $y(x) = \arccos \frac{1}{\sqrt{1+2x^2}}$ .
9. $y(x) = \frac{\ln x}{x^5}, y'''(x) = ?$	10. $x(t) = (2t + t^2)/(1 + t^3), y(t) = (2t - t^2)/(1 + t^3); t_0 = 1$ .
11. $\lim_{x \rightarrow 0.5} \frac{8x^3}{6x^2 - 5x + 1}; \lim_{x \rightarrow 1} \frac{1 - 4 \sin^2 \frac{\pi \cdot x}{6}}{1 - x}; \lim_{x \rightarrow \infty} x^4 e^{-x}$ .	
12. $y(x) = \sqrt{2(x-2)^2(8-x)} - 1. a=0, b=6$ .	13. $y(x) = \frac{x^3 + x^2 - 3x - 1}{2x^2 - 2}$ .
14. $y(x) = \frac{e^{2-x}}{2-x}$ .	

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1. $y(x) = \frac{2x^2 - x - 1}{3 \cdot \sqrt{2 + 4x}}$ .	2. $y(x) = \frac{1}{\ln 4} \cdot \ln \frac{1 + 2^x}{1 - 2^x}$ .
3. $y(x) = \operatorname{ctg} \sqrt[3]{5} - \frac{1}{8} \frac{\cos^2 4x}{\sin 8x}$ .	4. $y(x) = (\operatorname{tg} x)^{e^x}$ .
5. $y(x) = x^3 \arcsin x + x \cdot \sqrt{1 - x^2}$ .	6. $y(x) = \frac{3 \sin x}{\cos^2 x} + \frac{2 \sin x}{\cos^4 x}$ .
7. $x(t) = t + \sin t, y(t) = 2 - \cos t$ .	8. $y(x) = \operatorname{arctg}(\operatorname{sh} x) + \operatorname{sh} x \cdot \ln \operatorname{ch} x$ .
9. $y(x) = \frac{\ln(2x+5)}{2x+5}, y'''(x) = ?$	10. $x(t) = \sqrt{3} \cos t, y(t) = \sin t; t_0 = \pi/3$ .
11. $\lim_{x \rightarrow \infty} \frac{x^3 + 2x^2 + 8}{2x^3 - 3x^2 - 4x + 3}; \lim_{x \rightarrow 2} (2-x) \operatorname{tg} \frac{\pi \cdot x}{4}; \lim_{x \rightarrow 0} x e^{\frac{1}{x}}$ .	
12. $y(x) = x - 4 \cdot \sqrt{x} + 5. a=1, b=9$ .	13. $y(x) = \frac{9 - 10x^2}{\sqrt{4x^2 - 1}}$ .
14. $y(x) = 2x^3 + 9x^2 + 12x$ .	

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1. $y(x) = \frac{(1+x^8)\sqrt{1+x^8}}{12x^{12}}$ .	2. $y(x) = 2 \cdot \sqrt{e^x + 1} + \ln \frac{\sqrt{e^x + 1} - 1}{\sqrt{e^x + 1} + 1}$ .
3. $y(x) = \frac{\cos(\sin 5) \cdot \sin^2 2x}{2 \cos 4x}$ .	4. $y(x) = (x \cdot \sin x)^{\ln(x \cdot \sin x)}$ .
5. $y(x) = 3 \arcsin \frac{3}{4x+1} + 2 \cdot \sqrt{x^2 + 2}$ .	6. $y(x) = \frac{7^x \cdot (3 \sin 3x + \cos 3x \cdot \ln 7)}{9 + \ln^2 7}$ .
7. $x(t) = \sqrt{t}, y(t) = \frac{1}{\sqrt{1-t}}$ .	8. $y(x) = \ln(\cos^2 x + \sqrt{1 + \cos^4 x})$ .
9. $y(x) = (x+7) \ln(x+4), y''''(x) = ?$	10. $x(t) = 2t - t^2, y(t) = 3t - t^3; t_0 = 1$ .
11. $\lim_{x \rightarrow a} \left(2 - \frac{x}{a}\right)^{\operatorname{tg} \frac{\pi \cdot x}{2a}}; \lim_{x \rightarrow 1} \frac{\ln(2-x)}{1-x}; \lim_{x \rightarrow \infty} \frac{x^5}{xe^x}$ .	
12. $y(x) = \sqrt{2(x+1)^2(5-x)} - 2. a = -3, b = 3$ .	13. $y(x) = \frac{-8-x^2}{\sqrt{x^2-4}}$ .
14. $y(x) = \frac{x^2}{(x-1)^2}$ .	

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1. $y(x) = \frac{x^2}{2 \cdot \sqrt{1-3x^4}}$ .	2. $y(x) = \frac{2}{3} \sqrt{(\operatorname{arctg} e^x)^3}$ .
3. $y(x) = \frac{\sin(\cos 3) \cdot \cos^2 2x}{4 \sin 4x}$ .	4. $y(x) = (x^3 + 4)^{\operatorname{tg}(x)}$ .
5. $y(x) = \arcsin x - \ln(x + \sqrt{1+x^2})$ .	6. $y(x) = \ln \frac{\sin x}{\cos x + \sqrt{\cos 2x}}$ .
7. $x(t) = \operatorname{tg} t, y(t) = \frac{1}{\sin 2t}$ .	8. $y(x) = \frac{\ln x}{1+x^2} - 0.5 \ln \frac{x^2}{1+x^2}$ .
9. $y(x) = (1-x-x^2)e^{\frac{x}{2}}, y'''(x) = ?$	10. $x(t) = \arcsin \frac{t}{\sqrt{1+t^2}}, y(t) = \arccos \frac{1}{\sqrt{1+t^2}}; t_0 = -1$ .
11. $\lim_{x \rightarrow \infty} \frac{e^{2x} + x}{x^2}; \lim_{x \rightarrow 2} \frac{e^x - e^2}{x-2}; \lim_{x \rightarrow \pi/2} \left(2 - \frac{2x}{\pi}\right)^{\operatorname{tg}(x)}$ .	
12. $y(x) = 3 - x - \frac{4}{(x+2)^2}. a = -1, b = 2$ .	13. $y(x) = \frac{3x^2 - 10}{3 - 2x}$ .
14. $y(x) = x^2(x-2)^2$ .	

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1. $y(x) = \frac{(x^2 - 6)\sqrt{(4 + x^2)^5}}{120x^5}$ .	2. $y(x) = 0.5 \ln(e^{2x} + 1) - 2 \operatorname{arctg} e^x$ .
3. $y(x) = \frac{\cos \ln 7 \cdot \sin^2 7x}{7 \cos 14x}$ .	4. $y(x) = (x^2 - 1)^{\operatorname{sh} x}$ .
5. $y(x) = 2 \arcsin \frac{2}{3x+4} + \sqrt{9x^2 + 24x}$ .	6. $y(x) = \frac{-1}{3 \sin^3 x} - \frac{1}{\sin x}$ .
7. $x(t) = \sqrt{t}, y(t) = \sqrt[3]{1-t}$ .	8. $y(x) = x\sqrt{4-x^2} + 4 \arcsin \frac{x}{2}$ .
9. $y(x) = (2x^3 + 1) \cos x, y''''(x) = ?$	10. $x(t) = \frac{3at}{1+t^2}, y(t) = \frac{3at^2}{1+t^2}; t_0 = 2$ .
11. $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x \ln(1-x)}$ ; $\lim_{x \rightarrow 0} \left( \operatorname{tg} \left( \frac{\pi}{2} - x \right) \right)^{\operatorname{ctg} x}$ ; $\lim_{x \rightarrow \pi/2} (\operatorname{tg} x - \sec x)$ .	
12. $y(x) = 2(-x^2 + 7x - 7)/(x^2 - 2x + 2)$ . $a = 1, b = 4$ .	13. $y(x) = \frac{x^2 - 2x + 2}{x + 3}$ .
14. $y(x) = \frac{x^3 + 4}{x^2}$ .	

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1. $y(x) = \frac{(x^2 - 8)\sqrt{x^2 - 8}}{6x^3}$ .	2. $y(x) = \ln(e^x + 1) + \frac{18e^{2x} + 27e^x + 11}{6(e^x + 3)^3}$ .
3. $y(x) = \cos \operatorname{tg} 2 - \frac{1 \cos^2 8x}{16 \sin 16x}$ .	4. $y(x) = (\sin x)^{\frac{x}{2}}$ .
5. $y(x) = x(2x^2 + 1)\sqrt{x^2 + 1}$ .	6. $y(x) = (1 + x^2)e^{\operatorname{arctg}(x)}$ .
7. $x(t) = \sqrt{t^3 - 1}, y(t) = \ln t$ .	8. $y(x) = 2x + \ln \sin x + 2 \cos x $ .
9. $y(x) = \frac{\ln x}{x^3}, y''''(x) = ?$	10. $x(t) = 0.5t^2 - 0.25t^4, y(t) = 0.5t^2 + t^3/3, t_0 = 0$ .
11. $\lim_{x \rightarrow 0} \frac{2x^3 - 3x^2 + \operatorname{tg} x}{x^2 + 5x + \sin x}$ ; $\lim_{x \rightarrow \pi/4} \frac{\sin 2x - \cos 2x - 1}{\sin x - \cos x}$ ; $\lim_{x \rightarrow 0} (1 + x)^{\frac{1}{\ln x}}$ .	
12. $y(x) = \sqrt[3]{2(x-2)^2(5-x)}$ . $a = 1, b = 5$ .	13. $y(x) = \frac{x^2 + 6x + 9}{x + 4}$ .
14. $y(x) = 2x^3 + 3x^2 - 5$ .	

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1. $y(x) = \frac{4 + 3x^3}{x \cdot \sqrt[3]{(2 + x^3)^2}}$ .	2. $y(x) = 2(\sqrt{2^x - 1} - \operatorname{arctg} \sqrt{2^x - 1}) / \ln 2$ .
3. $y(x) = \operatorname{ctg} \cos 2 + \frac{1}{6} \cdot \frac{\sin^2 6x}{\cos 12x}$ .	4. $y(x) = (\sqrt{x})^{\exp(\frac{1}{x})}$ .
5. $y(x) = \ln \sqrt{1 + x^2} - \frac{\sqrt{1 + x^2}}{x}$ .	6. $y(x) = \frac{\operatorname{ctgx} + x}{1 - x \cdot \operatorname{ctgx}}$ .
7. $x(t) = \sqrt{t - 1}, y(t) = 1/\sqrt{t}$ .	8. $y(x) = \ln \left  \frac{x + \sqrt{x^2 + 1}}{2x} \right $ .
9. $y(x) = (2x + 3) \ln^2 x, y'''(x) = ?$	10. $x(t) = \sin^2 t, y(t) = \cos^2 t, t_0 = \pi/6$ .
11. $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x \cdot \ln(1 + x)}; \lim_{x \rightarrow 3} \frac{\arcsin(x - 3)}{\sqrt{x^2 - 5x + 6}}; \lim_{x \rightarrow 0} \left[ \frac{\sin(a + mx)}{\sin(a + nx)} \right]^{\frac{1}{x}}$ .	
12. $y(x) = \frac{-x^2}{2} + \frac{8}{x} + 8, a = -4, b = -1$ .	13. $y(x) = \frac{x^2 + 2x - 1}{2x + 1}$ .
14. $y(x) = \frac{x^3 - 32}{x^2}$ .	

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1. $y(x) = \sqrt[3]{\frac{(1 + \sqrt[4]{x^3})^2}{\sqrt{x^3}}}$ .	2. $y(x) = 2(x - 2)\sqrt{1 + e^x} - 2 \ln \left( \frac{\sqrt{1 + e^x} - 1}{\sqrt{1 + e^x} + 1} \right)$ .
3. $y(x) = \sqrt[3]{\operatorname{ctg} 2} - \frac{\cos^2 10x}{20 \cdot \sin 20x}$	4. $y(x) = \exp(\cos x) \cdot (x)^{\exp(\cos x)}$
5. $y(x) = \sqrt{1 - 3x - 2x^2} + \operatorname{arctg} \frac{4x + 1}{17}$	6. $y(x) = \frac{1}{2 \sin(\alpha/2)} \cdot \operatorname{arctg} \frac{2x \cdot \sin(\alpha/2)}{1 - x^2}$
7. $x(t) = \sqrt{t - 1}, y(t) = \ln(t - 1)$	8. $y(x) = \operatorname{arctg} \frac{x^2 - 1}{x}$
9. $y(x) = x^2 \cdot \sin(5x - 3), y'''(x) = ?$	10. $x(t) = (1 + \ln t)/t^2, y(t) = (3 + 2 \ln t)/t, t_0 = 1$
11. $\lim_{x \rightarrow 0} \left( \frac{1}{x^2} - \operatorname{ctgx} \right); \lim_{x \rightarrow \infty} \frac{e^{3x} + 6x}{x^2}; \lim_{x \rightarrow 0} \frac{(a^x - 1) \ln b - (b^x - 1) \ln a}{x^2}$ .	
12. $y(x) = \frac{-2x(2x + 3)}{x^2 + 4x + 5}, a = -2, b = 1$	13. $y(x) = \frac{2x^2 - 9}{\sqrt{x^2 - 1}}$
14. $y(x) = \frac{-\exp(-x - 2)}{x + 2}$	

1. $y(x) = \frac{x^6 + x^3 - 2}{\sqrt{1-x^3}}$ .	2. $y(x) = x + \frac{1}{1+e^x} - \ln(1+e^x)$ .
3. $y(x) = \frac{1}{3} \operatorname{costg} \frac{1}{2} + 0.1 \frac{\sin^2 10x}{\cos 20x}$ .	4. $y(x) = x^{\exp(\sin x)}$ .
5. $y(x) = \sqrt{(4+x)(1+x)} + 3 \ln(\sqrt{4+x} + \sqrt{1+x})$ .	6. $y(x) = \operatorname{arctg} \frac{\sqrt{\sqrt{x^4+1}-x}}{x}$ .
7. $x(t) = t + \sin t, y(t) = 2 + \cos t$ .	8. $y(x) = \operatorname{arctg} \left( \operatorname{tg} \frac{x}{2} + 1 \right)$ .
9. $y(x) = (2x^2 - 7) \ln(x-1), y'''(x) = ?$	10. $x(t) = \sin^3 t, y(x) = \cos^3 t, t_0 = \pi/6$ .
11. $\lim_{x \rightarrow 0} \frac{b \cdot \arcsin ax - a \cdot \arcsin bx}{x^3}; \quad \lim_{x \rightarrow \pi/2} \left[ \frac{\pi}{2 \cos x} - x \cdot \operatorname{tg} x \right]; \quad \lim_{x \rightarrow 0} \frac{\ln \operatorname{tg}(\pi/4 + bx)}{ax}$ .	
12. $y(x) = \sqrt[3]{2(x-1)^2(x-4)}. \quad a=0, b=4$ .	13. $y(x) = \frac{x^3 - 3x^2 - 2x + 1}{1 - 3x^2}$ .
14. $y(x) = 1 - \sqrt[3]{x^2 - 2x}$ .	

1. $y(x) = \frac{(x^2 - 2)\sqrt{4+x^2}}{24x^3}$ .	2. $y(x) = x - 3 \ln \left[ (1 + e^{\frac{x}{6}}) \sqrt{1 + e^{\frac{x}{3}}} \right] - \operatorname{arctg} e^{\frac{x}{6}}$ .
3. $y(x) = \ln \sin \frac{1}{6} - \frac{1}{24} \frac{\cos^2 12x}{\sin 24x}$ .	4. $y(x) = x^{\operatorname{arctg} x}$ .
5. $y(x) = \ln \frac{\sqrt{x^2 - x + 1}}{x} + \operatorname{arctg} \frac{2x-1}{\sqrt{3}}$ .	6. $y(x) = (\sin 4x \cdot \ln 6 - 4 \cos 4x) \cdot 6^x$ .
7. $x(t) = \ln \frac{t}{\sqrt{1-t^2}}, y(t) = \arcsin \sqrt{1-t^2}$ .	8. $y(x) = \ln  \cos \sqrt{x}  + \sqrt{x} \cdot \operatorname{tg} \sqrt{x}$ .
9. $y(x) = x \cdot \cos x^2, y'''(x) = ?$	10. $x(t) = \frac{t+1}{t}, y(t) = \frac{t-1}{t}, t_0 = -1$ .
11. $\lim_{x \rightarrow \pi/4} \frac{\operatorname{tg} x - \operatorname{ctg} x}{\operatorname{ctg} 2x}; \quad \lim_{x \rightarrow 0} [e^x - x - 0.5x^2]; \quad \lim_{x \rightarrow a} \ln \frac{a+x}{2a} \cdot \operatorname{tg} \frac{\pi \cdot x}{2a}$ .	
12. $y(x) = x^2 - 2x + \frac{16}{x-1} - 13. \quad a=2, b=5$ .	13. $y(x) = \frac{21-x^2}{7x+9}$ .
14. $y(x) = \sqrt[3]{x(x+3)^2}$ .	



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1. $y(x) = \frac{1+x^2}{2\sqrt{1+2x^2}}$ .	2. $y(x) = x + \frac{8}{1+e^{\frac{x}{4}}}$ .
3. $y(x) = 8 \sin ctg 3 + \frac{1}{5} \frac{\sin^2 5x}{\cos 10x}$ .	4. $y(x) = x^{29^x} \cdot 29^x$ .
5. $y(x) = \frac{\arcsin x}{\sqrt{1-x^2}} + 0.5 \ln \frac{1-x}{1+x}$ .	6. $y(x) = \operatorname{arctg} \frac{\sqrt{2tgx}}{1-tgx}$ .
7. $x(t) = (\arccost)^2, y(t) = (1 + \cos^2 t)^2$ .	8. $y(x) = x(\sin \ln x - \cos \ln x)$ .
9. $y(x) = \frac{\ln x}{x^2}, y'''(x) = ?$	10. $x(t) = \ln(1+t^2), y(t) = t - \operatorname{arctgt}, t_0 = 1$ .
11. $\lim_{x \rightarrow 1} \left[ \frac{1}{\ln x} - \frac{4}{x^4 - 1} \right]; \lim_{x \rightarrow \infty} \left[ x - x^2 \ln \left( 1 + \frac{1}{x} \right) \right]; \lim_{x \rightarrow 0} (\ln ctgx)^{tgx}$ .	
12. $y(x) = 2\sqrt{x-1} - x + 2. a = 1, b = 5$ .	13. $y(x) = \frac{x^2 + 16}{\sqrt{9x^2 - 16}}$ .
14. $y(x) = \frac{x^3 - 27x + 54}{x^3}$ .	

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1. $y(x) = \frac{(3x+2)\sqrt{x-1}}{4x^2}$ .	2. $y(x) = \ln(e^x + \sqrt{e^{2x} - 1}) + \operatorname{arctge}^x$ .
3. $y(x) = \frac{\cos ctg 3 \cdot \cos^2 12x}{28 \sin 28x}$ .	4. $y(x) = x^9 \cdot x^{\exp(x)}$ .
5. $y(x) = x \cdot \arcsin \sqrt{\frac{x}{x+1}} - \sqrt{x}$ .	6. $y(x) = \operatorname{arctg} \frac{2 \sin x}{\sqrt{9 \cos^2 x - 4}}$ .
7. $x(t) = \frac{1}{t}, y(t) = \frac{1}{1+t^2}$ .	8. $y(x) = \cos x \cdot \ln tgx - \ln tg \frac{x}{2}$ .
9. $y(x) = (\cos 2x - 3 \cos 3x) \cdot e^{-x}, y'''(x) = ?$	10. $x(t) = \frac{1+t^3}{t^2-1}, y(t) = \frac{t}{t^2-1}, t_0 = 2$ .
11. $\lim_{x \rightarrow 0} \frac{tgx - x}{x - \sin x}; \lim_{x \rightarrow 1} \left( \frac{1}{\ln x} - \frac{x}{\ln x} \right); \lim_{x \rightarrow a} \left[ 3 - \frac{2x}{a} \right]^{2tg \frac{\pi \cdot x}{2a}}$ .	
12. $y(x) = \frac{-x^2}{2} + 2x + \frac{8}{x-2} + 5. a = -2, b = 1$ .	13. $y(x) = \frac{4x^3 - 3x}{4x^2 - 1}$ .
14. $y(x) = \ln \frac{x}{x-2} - 2$ .	

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1. $y(x) = \frac{\sqrt{(1+x^2)^3}}{3x^3}$ .	2. $y(x) = x - e^{-x} \cdot \arcsin e^x - \ln(1 + \sqrt{1 - e^{2x}})$ .
3. $y(x) = \frac{\operatorname{ctg} \frac{1}{3} \cdot \sin^2 15x}{15 \cos 30x}$ .	4. $y(x) = (\arcsin x)^{\exp(x)}$ .
5. $y(x) = \arcsin \frac{1}{2x+3} + 2\sqrt{x^2 + 3x}$ .	6. $y(x) = (\cos x + 2^x \sin 2x) \cdot 5^x$ .
7. $x(t) = \frac{1}{t}, y(t) = \frac{t}{1+t^2}$ .	8. $y(x) = \sqrt{x} - (1+x) \operatorname{arctg} \sqrt{x}$ .
9. $y(x) = (5x-8) \cdot 2^{-x}, y'''(x) = ?$	10. $x(t) = t - t^4, y(t) = t^2 - t^3, t_0 = 1$ .
11. $\lim_{x \rightarrow 1} \frac{1 - 8 \sin^3 \frac{\pi \cdot x}{6}}{1 - x^3}; \lim_{x \rightarrow -\infty} (\pi + 2 \operatorname{arctg} x) \cdot \ln x ; \lim_{x \rightarrow 0} (\cos mx)^{\frac{n}{x^2}}$ .	
12. $y(x) = 8x + \frac{4}{x^2} - 15, a = 0.5; b = 2$ .	13. $y(x) = \frac{x^2 - 6x + 4}{3x - 2}$ .
14. $y(x) = 3 \cdot \sqrt[3]{(x-2)^2} - 2x + 6$ .	

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1. $y(x) = \frac{x^6 + 8x^3 - 128}{\sqrt{8 - x^3}}$ .	2. $y(x) = x - \ln(1 + e^x) - 2e^{\frac{-x}{2}} \operatorname{arctg} e^{\frac{x}{2}}$ .
3. $y(x) = \frac{\sin \operatorname{tg} 7 \cdot \cos^2 16x}{32 \sin 32x}$ .	4. $y(x) = x^{\arcsin x}$ .
5. $y(x) = 6 \arcsin \frac{x}{2} + \frac{x}{4} \sqrt{4 - x^2}$ .	6. $y(x) = \ln \frac{\sqrt{2} + \operatorname{th} x}{\sqrt{2} - \operatorname{th} x}$ .
7. $x(t) = t\sqrt{t^2 + 1}, y(t) = \ln \frac{1 + \sqrt{1 + t^2}}{t}$ .	8. $y(x) = x\sqrt{x^2 + 1} + \ln x + \sqrt{x^2 - 1} $ .
9. $y(x) = x \cdot \ln(1 - 3x), y''''(x) = ?$	10. $x(t) = 2 \cos t, y(t) = \sin t, t_0 = -\pi/3$ .
11. $\lim_{x \rightarrow 0} \left(\frac{1}{x}\right)^{\operatorname{tg} x}; \lim_{x \rightarrow 1} \frac{a^{\ln x} - x}{\ln x}; \lim_{x \rightarrow a} \arcsin \frac{x-a}{a} \cdot \operatorname{ctg}(x-a)$ .	
12. $y(x) = \sqrt[3]{2(x+2)^2(x-4)} + 3, a = -4, b = 2$ .	13. $y(x) = \frac{2x^3 + 2x^2 - 3x - 1}{2 - 4x^2}$ .
14. $y(x) = 4x + 8 - 6\sqrt[3]{(x+2)^2}$ .	

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1. $y(x) = (1-x^2)\sqrt[5]{x^3+1}/x$ .	2. $y(x) = \frac{1}{m\sqrt{ab}} \operatorname{arctg}\left(\sqrt{\frac{a}{b}} \cdot e^{mx}\right)$ .
3. $y(x) = \frac{\sqrt[5]{\operatorname{ctg} 2} \cdot \cos^2 16x}{32 \sin 36x}$ .	4. $y(x) = (\cos 5x)^{\exp(x)}$
5. $y(x) = x^3 \arccos x + (x^2 + 2)\sqrt{1-x^2}$ .	6. $y(x) = \frac{\cos x}{\sin^2 x} - 2 \cos x + \ln \operatorname{tg} x$ .
7. $x(t) = \ln \operatorname{tg} t, y(t) = \frac{1}{\sin^2 t}$ .	8. $y(x) = x^2 \operatorname{arctg} \sqrt{x^2-1} - \sqrt{x^2-1}$ .
9. $y(x) = (3x-7) \cdot 3^{-x}, y''''(x) = ?$	10. $x(t) = \sin t, y(t) = \cos 2t, t_0 = \pi/6$ .
11. $\lim_{x \rightarrow 0} \frac{e^{ax} - e^{-ax}}{\ln(1+x)}$ ; $\lim_{x \rightarrow 0} \left(\frac{1}{x}\right)^{\sin x}$ ; $\lim_{x \rightarrow 1} \left(\frac{1}{\ln x} - \frac{1}{x-1}\right)$ .	
12. $y(x) = \frac{4}{x^2} - 8x - 15, a = -2, b = -0.5$ .	13. $y(x) = \frac{4x^2 + 9}{4x + 8}$
14. $y(x) = -(2x+3) \cdot \exp(2x+4)$	

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1. $y(x) = \frac{(x-2)\sqrt{2x+3}}{x^2}$ .	2. $y(x) = \frac{\exp(x^3)}{1+x^3}$ .
3. $y(x) = \frac{\operatorname{ctg} \sin 3 \cdot \sin^2 17x}{17 \cos 34x}$ .	4. $y(x) = x^{\operatorname{tg} x}$ .
5. $y(x) = \frac{\sqrt{x^2+2}}{x^2} - \ln \frac{\sqrt{2} + \sqrt{x^2+2}}{x}$ .	6. $y(x) = 3^x \cdot (4 \sin 4x + \cos 4x)$ .
7. $x(t) = \ln(1-t^2), y(t) = \arcsin \sqrt{1-t^2}$ .	8. $y(x) = \operatorname{tg}\left(2 \arccos \sqrt{1-2x^2}\right)$ .
9. $y(x) = e^{\frac{x}{2}} \cdot \sin 2x, y''''(x) = ?$	10. $x(t) = t^3 + 1, y(t) = t^2, t_0 = -2$ .
11. $\lim_{x \rightarrow 2} \frac{\ln(x^2-3)}{x^2+3x-10}$ ; $\lim_{x \rightarrow \infty} \left(a^{\frac{1}{x}} - 1\right) \cdot x$ ; $\lim_{x \rightarrow 0} x^{\frac{1}{\ln(e^x-1)}}$ .	
12. $y(x) = x^2 + 4x + \frac{16}{x+2} - 9, a = -1, b = 2$ .	13. $y(x) = \frac{x^2-3}{\sqrt{3x^2-2}}$ .
14. $y(x) = \frac{4x^2}{3+x^2}$ .	

1. $y(x) = \frac{6 + 2\sqrt[3]{x^2} - 3x}{4 - 5x\sqrt{x} + x^3}$ .	2. $y(x) = \frac{\operatorname{tg}x - \operatorname{ctg}x}{\cos^3 x} - \sin x^2$ .
3. $y(x) = 2 \lg(x+2) - \sin \ln x + \arccos \frac{x}{3}$ .	4. $y(x) = x \cdot 3^{x^2} - (x+1)^{\sqrt{x}} + 4x^3$ .
5. $y(x) = x\sqrt{x} + 3\sqrt[3]{x^2} - 5\sqrt[4]{x}$ .	6. $y^3 x^2 + \sin x - 2xy + \ln(x+1) = 0$ .
7. $x(t) = \sin t^2, y(t) = 1 + 2t^3$ .	8. $y(x) = 2 \sin \cos(x-2) + \operatorname{tg}x^2 \cdot \sqrt[3]{x^3 + 4x - 5}$ .
9. $y(x) = \frac{\operatorname{tg}x}{x+1}, y'''(x) = ?$	10. $x(t) = -\cos t + t \cdot \sin t, y(t) = \sin t - t \cdot \cos t, t_0 = \pi/2$ .
11. $\lim_{x \rightarrow \infty} x^2 \cdot \left(1 - e^{\frac{1}{x}}\right); \lim_{x \rightarrow \infty} \left(1 - \frac{2}{x^2}\right)^x; \lim_{x \rightarrow 0} \left(\frac{1}{x}\right)^{\sin 2x}$ .	
12. $y(x) = -\frac{2}{3} \ln x - \frac{1}{6} x^2 + x, a = 0.5; b = 3$ .	13. $y(x) \cdot (x^2 - 3bx + 2b^2) = x^3 - 3ax^2 + a^3$ .
14. $y(x) = \frac{x^3 + 2x^2 + 7x - 3}{2x^2}$ .	

1. $y(x) = \sqrt{x^3 + 2x^2 + 2} + \frac{(x-3)^2}{\sqrt[3]{x^3 + 1}}$ .	2. $y(x) = \ln \frac{x^2 + 1}{x^3 + 3x^2 + 7} - \operatorname{arctg} \frac{\sin x}{x+1}$ .
3. $y(x) = x^4 + \sin \cos x + e^x \ln \operatorname{tg}x$ .	4. $y(x) = (x^2 + 2x - 1)^{1 - \sin x}$ .
5. $y(x) = 3^{x+1} - \sin^2 e^x + \ln(e^x \cos x) + 4\sqrt[12]{15}$ .	6. $xy^2 - 2xy + 3x^2 y - 2x + 4y + 5 = 0$ .
7. $x(t) = \ln \sin t^2, y(t) = \cos t^2$ .	8. $y(x) = \operatorname{arctg}(x-2)^2 + (x^3 - \ln x) \cos^2 x$ .
9. $y(x) = \operatorname{tg}x - \operatorname{ctg}x, y''''(x) = ?$	10. $x(t) = 3t, y(t) = t^2 - 6, t_0 = 1$ .
11. $\lim_{x \rightarrow 0} \frac{e^{\sin x} - e^x}{\ln(e^x - 1)}; \lim_{x \rightarrow +\infty} (x^n \cdot e^{-x}); \lim_{x \rightarrow 0} \frac{\ln \cos 2x}{x - \sin x}$ .	
12. $y(x) = x^2 e^{-x}, a = -1, b = 4$ .	13. $y^3(x) = a^3 - x^3$ .
14. $y(x) = \frac{x^4}{x^3 - 1}$ .	

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1. $y(x) = \frac{(2x+1)\sqrt{x^2-x}}{x^2}$ .	2. $y(x) = \frac{e^x}{2} \cdot [(x^2-1)\cos x + (x-1)^2 \sin x]$ .
3. $y(x) = \sqrt{\operatorname{tg} 4x} + \frac{\sin^2 21x}{21 \cos 42x}$ .	4. $y(x) = (x^4 + 5)^{\operatorname{ctg}(x)}$ .
5. $y(x) = 3 \arcsin \frac{3}{x+2} + \sqrt{x^2 + 4x - 5}$ .	6. $y(x) = \frac{\ln(\operatorname{ctg} x + \operatorname{ctg} \alpha)}{\sin \alpha}$ .
7. $x(t) = \sin t, y(t) = \ln \cos t$ .	8. $y(x) = \ln(x + \sqrt{1+x^2}) - \sqrt{1+x^2} \operatorname{arctg} x$ .
9. $y(x) = \frac{\ln(3+x)}{3+x}, y'''(x) = ?$	10. $x(t) = t \cdot \cos t, y(t) = t \cdot \sin t, t_0 = \pi/2$ .
11. $\lim_{x \rightarrow 0} \frac{\ln(1+x^2)}{\cos 3x - e^{-x}}; \lim_{x \rightarrow 0} x^n \cdot \ln x; \lim_{x \rightarrow 0} x^x$ .	
12. $y(x) = \frac{10x+10}{x^2+2x+2}, a = -1, b = 2$ .	13. $y(x) = \frac{x^3 + 3x^2 - 2x - 2}{2 - 3x^2}$ .
14. $y(x) = \frac{x^2 - x + 1}{x - 1}$ .	

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1. $y(x) = 2\sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}$ .	2. $y(x) = \operatorname{arctg}(e^x - e^{-x})$ .
3. $y(x) = \cos \ln 3 - \frac{1}{44} \frac{\cos^2 22x}{\sin 44x}$ .	4. $y(x) = (x^2 + 1)^{\cos x}$ .
5. $y(x) = \operatorname{arctg} \sqrt{x^2 - 1} - \frac{\ln x}{\sqrt{x^2 - 1}}$ .	6. $y(x) = \frac{2^x (\sin x + \cos x \cdot \ln 2)}{1 + (\ln 2)^2}$ .
7. $x(t) = \ln \sqrt{\frac{1-t}{1+t}}, y(t) = \sqrt{1-t^2}$ .	8. $y(x) = \ln(e^x + \sqrt{e^{2x} - 1}) + \arcsin e^{-x}$ .
9. $y(x) = (4x+3)e^{-x}, y''''(x) = ?$	10. $x(t) = \arcsin \frac{t}{\sqrt{1+t^2}}, y(t) = \arccos \frac{1}{\sqrt{1+t^2}}, t_0 = 1$
11. $\lim_{x \rightarrow 1} \frac{x^2 - 1 + \ln x}{e^x - e}; \lim_{x \rightarrow 0} x^2 \cdot \ln x; \lim_{x \rightarrow 0} (\sin x)^x$ .	
12. $y(x) = 4 - x - \frac{4}{x^2}; a = 1, b = 4$ .	13. $y(x) = \frac{3x^2 - 7}{2x + 1}$ .
14. $y(x) = \ln \frac{x+6}{x} - 1$ .	

1. $y(x) = \frac{1}{(x+2)\sqrt{x^2+4x+4}}$ .	2. $y(x) = 3 \cdot \exp(\sqrt[3]{x}) \cdot [\sqrt[3]{x^5} - 5\sqrt[3]{x^4} 20x - 120]$ .
3. $y(x) = \ln \cos 1 + \frac{\sin^2 23x}{23 \cos 46x}$ .	4. $y(x) = x^{3^x}$ .
5. $y(x) = x \cdot \ln[\sqrt{1-x} + \sqrt{1+x}] + 0.5(\arcsin x - x)$ .	6. $y(x) = \frac{\ln(\operatorname{arctg} x + \operatorname{ctg} \alpha)}{\sin(\alpha + 1)}$ .
7. $x(t) = \sqrt{1-t^2}, y(t) = \frac{t}{\sqrt{1-t^2}}$ .	8. $y(x) = \ln \operatorname{tg} \frac{x}{2} - \frac{x}{\sin x}$ .
9. $y(x) = (1+x^2)\operatorname{arctg} x; y'''(x) = ?$	10. $x(t) = \frac{1+t^2}{t^2}, y(t) = \frac{3}{2t^2} + \frac{2}{t}; t_0 = 2$ .
11. $\lim_{x \rightarrow 0} \frac{x - \sin x}{x^3}; \lim_{x \rightarrow 0} \left( \frac{1}{x} - \frac{1}{e^x - 1} \right); \lim_{x \rightarrow \pi/2} (\operatorname{tg} x)^{2 \cos x}$ .	
12. $y(x) = \frac{2-x^2}{\sqrt{9x^2-4}}; a = -3, b = 3$ .	13. $y(x) = \frac{2-x^2}{\sqrt{9x^2-4}}$ .
14. $y(x) = 2x + 6 - 3\sqrt[3]{9x+3}^2$ .	

1. $y(x) = 3 \frac{\sqrt[3]{x^2+x+1}}{x+1}$ .	2. $y(x) = -\frac{e^{3x}}{3 \cdot \operatorname{sh}^3 x}$ .
3. $y(x) = \sqrt[3]{\cos \sqrt{2}} - \frac{1}{52} \frac{\cos^2 26x}{\sin 52x}$ .	4. $y(x) = x^{\operatorname{ctg}(x^2)}$ .
5. $y(x) = \ln \sqrt[3]{\frac{x-1}{x+1}} + x \cdot \operatorname{arctg} x$ .	6. $y(x) = 2 \frac{\cos x}{\sin^4 x} + \frac{3 \cos x}{\sin^2 x}$ .
7. $x(t) = e^t, y(t) = \arcsin t$ .	8. $y(x) = \sqrt{\operatorname{ctg} x} - \frac{1}{3} \sqrt{\operatorname{tg}^3 x}$ .
9. $y(x) = \frac{\ln x}{x^2}; y'''(x) = ?$	10. $x(t) = t \cdot \sin t + \cos t, y(t) = \sin t - t \cdot \cos t; t_0 = \pi/2$ .
11. $\lim_{x \rightarrow \infty} \frac{x e^{\frac{x}{2}}}{x + e^x}; \lim_{x \rightarrow 0} \arcsin x \cdot \operatorname{ctg} x; \lim_{x \rightarrow \pi/2} (\pi - 2x)^{\cos x}$ .	
12. $y(x) = \frac{10x}{1+x^2}; a = 0, b = 3$ .	13. $y(x) = \frac{2x^2 - 6}{x - 2}$ .
14. $y(x) = 1 - \sqrt[3]{x^2 + 4x + 3}$ .	

1. $y(x) = 3 \cdot \sqrt[3]{(x+1)(x-1)^2}$ .	2. $y(x) = \arcsin e^x - \sqrt{1 - e^{2x}}$ .
3. $y(x) = \sin \sqrt[3]{\operatorname{tg} 2} - \frac{\cos^2 28x}{56 \sin 56x}$ .	4. $y(x) = (\operatorname{tg} x)^{\operatorname{tg} x}$ .
5. $y(x) = \sqrt{x^2 + 1} - 0.5 \ln(\sqrt{x^2 - 1} - x)$ .	6. $y(x) = \frac{\cos x}{2 + \sin x} + \operatorname{arctg} \frac{\operatorname{tg} x}{2}$ .
7. $x(t) = \ln \frac{1-t}{1+t}, y(t) = \sqrt{1-t^2}$ .	8. $y(x) = \sqrt[3]{\frac{x+2}{x-2}}$ .
9. $y(x) = (4x^3 + 5)e^{2x+1}, y''''(x) = ?$	10. $x(t) = 1 - t^2, y(t) = t - t^3, t_0 = 2$ .
11. $\lim_{x \rightarrow a} \frac{\ln(x-a)}{\ln(e^x - e^a)}$ ; $\lim_{x \rightarrow 0} (1 - \cos x) \operatorname{ctg} x$ ; $\lim_{x \rightarrow 0} (\cos 2x)^{\frac{3}{x^2}}$ .	
12. $y(x) = 2x^2 + \frac{108}{x} - 59; a = 2, b = 4$ .	13. $y(x) = \frac{4x^3 + 3x^2 - 8x - 2}{2 - 3x^2}$ .
14. $y(x) = \frac{(x-1)^2}{(x+1)^2}$ .	

1. $y(x) = \frac{x+7}{6 \cdot \sqrt{x^2 + 2x - 7}}$ .	2. $y(x) = -0.5(x^4 + 2x^2 + 2)e^{-x^2}$ .
3. $y(x) = \sin^3 \cos 2 - \frac{\cos^2 30x}{60 \sin 60x}$ .	4. $y(x) = (1 + x^8)^{\operatorname{tg} x}$ .
5. $y(x) = \frac{1}{3}(x-2)\sqrt{x+1} + \ln(\sqrt{x+1} + 1)$ .	6. $y(x) = \frac{\ln 3^x \cdot \sin 2x - 2 \cos x}{\ln^2 3 + 4}$ .
7. $x(t) = c \operatorname{ost} t + t \sin t, y(t) = \sin t - t \sin t$ .	8. $y(x) = \ln x^2 - 1  - \frac{1}{x^2 - 1}$ .
9. $y(x) = \frac{\ln x-1 }{\sqrt{x-1}}; y''''(x) = ?$	10. $x(t) = t(1 - \sin t), y(t) = t \operatorname{cost}; t_0 = 0$ .
11. $\lim_{x \rightarrow \infty} \frac{\ln x}{x^n}$ ; $\lim_{x \rightarrow 1} \left[ \frac{p}{1-x^p} - \frac{q}{1-x^q} \right]$ ; $\lim_{x \rightarrow \infty} \left( 1 + \frac{3}{x} \right)^x$ .	
12. $y(x) = x - 4\sqrt{x+2} + 8; a = -1, b = 7$ .	13. $y(x) = \frac{x^3 - 4x}{3x^2 - 4}$ .
14. $y(x) = \sqrt[3]{x^2 + 4x + 3}$ .	

1. $y(x) = \frac{x\sqrt{x+1}}{x^2+x+1}$ .	2. $y(x) = \frac{\exp(x^2)}{1+x^2}$ .
3. $y(x) = \cos^2 \sin 3 + \frac{\sin^2 29x}{29 \cos 58x}$ .	4. $y(x) = (\cos 2x)^{\ln \cos x}$ .
5. $y(x) = (2+3x)\sqrt{x-1} + \arctg(x-1)$ .	6. $y(x) = 0.5 \ln \frac{1+\cos x}{1-\cos x} - \frac{1}{\cos x} - \frac{1}{3 \cos^3 x}$ .
7. $x(t) = \cos t + \sin t, y(t) = \sin 2t$ .	8. $y(x) = \ln  2x + 2\sqrt{x^2+x+1} $ .
9. $y(x) = (3-x^2) \ln^2 x; y'''(x) = ?$	10. $x(t) = 3 \cos t, y(t) = 4 \sin t; t_0 = \pi/4$ .
11. $\lim_{x \rightarrow 0} \left[ \frac{\operatorname{tg} x}{x} \right]^{\frac{1}{x^2}}; \lim_{x \rightarrow 0} (1 - e^{2x}) \cdot \operatorname{ctg} x; \lim_{x \rightarrow 1} \frac{\operatorname{tg} \frac{\pi \cdot x}{2}}{\ln(1-x)}$ .	
12. $y(x) = -\frac{2(x^2+3)}{x^2+2x+5}; a = -5, b = 1$ .	13. $y(x) = \frac{17-x^2}{4x-5}$ .
14. $y(x) = -\frac{3 \cdot \sqrt[3]{6(x+2)^2}}{x^2+8x+24}$ .	

1. $y(x) = \frac{x^4 + 2x^2 - 3x}{12 \cdot \sqrt[3]{x-1}}$ .	2. $y(x) = x^2 + \ln(3 + 2^x + 3 \cdot \sqrt{\operatorname{tg} x + 1})$ .
3. $y(x) = \sqrt{x} \cdot \ln(\sqrt[3]{x} + \sqrt{x+2})$ .	4. $y(x) = \sin 2 + 0.5 \frac{\cos^2 3x}{\sin 2x}$ .
5. $y(x) = \frac{x^2 \cdot \operatorname{arctg} x}{1+x^2} + \ln \sqrt[3]{1-x}$ .	6. $y(x) = \operatorname{arctg} \sqrt{\frac{x^2+1}{x^3-1}}$ .
7. $x(t) = \cos^2 t, y(t) = \arcsin t$ .	8. $y(x) = x^2 \cdot \operatorname{tg} \frac{1+x}{2} + \ln \operatorname{tg} \frac{x}{2}$ .
9. $y(x) = (5x^2 + 1) \sin^2 x; y'''(x) = ?$	10. $x(t) = \sin^2 t, y(t) = 2 \cos^2 t; t_0 = \pi/3$ .
11. $\lim_{x \rightarrow \pi/4} (\operatorname{tg} x)^{\frac{1}{\operatorname{tg} 2x}}; \lim_{x \rightarrow \infty} (x^2 - 1) \ln x; \lim_{x \rightarrow 1} \frac{x^3 - 2x^2 + x}{\sqrt{x-1}}$ .	
12. $y(x) = x - 4\sqrt{x} + 6; a = 1, b = 4$ .	13. $y(x) = \frac{\exp(2-x)}{2-x}$ .
14. $y(x) = \frac{21-x^2}{7x+9}$ .	



1. $y(x) = \frac{(2x-1)\sqrt{x^2-1}}{2x^4}$ .	2. $y(x) = (1 + \sin x + \cos 3x) \cdot 2^{3x}$ .
3. $y(x) = \operatorname{tg} 3 - 0.5 \frac{\cos 4x}{\sin 5x}$ .	4. $y(x) = (\operatorname{tg} x)^{2^x}$ .
5. $y(x) = \ln(1 + \cos 2x + \sqrt{x})$ .	6. $y(x) = x^{\ln 2} + \cos \ln(x+1)^2 + x$ .
7. $x(t) = e^{2t} \cos t, y(t) = e^{3t} \sin t$ .	8. $y(x) = \sqrt{3x+1} + \ln(x + 2\sqrt{1+x})$ .
9. $y(x) = (x^2 + 5x)e^{3x}; y'''(x) = ?$	10. $x(t) = a \cdot (t + \sin t), y(t) = a \cdot \cos t; t_0 = \pi/4$ .
11. $\lim_{x \rightarrow \infty} \frac{x^2 + x + 1}{3x + 5}; \quad \lim_{x \rightarrow \pi/4} \frac{1 - 2 \cos^2 x}{\pi^2 - 16x^2}; \quad \lim_{x \rightarrow 0} x^2 \cdot \ln \frac{1}{x}$ .	
12. $y(x) = 2\sqrt{x-1} - x + 2. \quad a = 1, b = 4.$	13. $y(x) = \ln \frac{x}{x-2} - 2.$
14. $y(x) = \frac{x^3 - 4}{x^2}$ .	

1. $y(x) = \frac{x^4 + 3x}{4(x^2 - 5)}$ .	2. $y(x) = 2 \operatorname{arctg}(e^x + 2)$ .
3. $y(x) = \ln \operatorname{tg}(0.5) - 0.25 \frac{\cos^2 3x}{\cos 4x}$ .	4. $y(x) = (3x)^{\ln x}$ .
5. $y(x) = x^2(x^2 + 3x - 1) + 3 \ln(x + 5 \cdot \sqrt[3]{x-3})$ .	6. $y(x) = \operatorname{arctg} \sin \frac{x}{\sqrt{x+2}}$ .
7. $x(t) = t + 2\sqrt{t}, y(t) = t^3 - 1$ .	8. $y(x) = \ln \cos \frac{1}{\sqrt{x^2-1}}$ .
9. $y(x) = \frac{\ln(x+1)}{x-1}; y'''(x) = ?$	10. $x(t) = \frac{2t}{1+t^2}, y(t) = \frac{t-1}{1+t^2}; t_0 = 3$ .
11. $\lim_{x \rightarrow \infty} \frac{x^3 - 1}{6x^3 - 5x + 1}; \quad \lim_{x \rightarrow \infty} x^3 \cdot \exp(-x); \quad \lim_{x \rightarrow 1} \frac{1 - 4 \sin^2 \frac{\pi \cdot x}{6}}{1 - x^3}$ .	
12. $y(x) = -\frac{x^2}{2} + 2x + \frac{8}{x-2} + 5; a = -2, b = 0.$	13. $y(x) = \frac{3x-2}{x^3}$ .
14. $y(x) = \frac{1}{x^4 - 1}$ .	

1. $y(x) = \frac{2 \cdot \sqrt{x^2 - 1}}{x^2 + x - 1}$ .	2. $y(x) = \cos 2 \cdot \ln \frac{1 + 3x}{1 + 3^x}$ .
3. $y(x) = \operatorname{arctg} \ln e^4 - 0.5 \frac{\sin 2x}{\cos^2 x}$ .	4. $y(x) = (x)^{\operatorname{tg} x}$ .
5. $y(x) = x^2 \cdot \ln \operatorname{tg} x - \sqrt{\frac{x^2 - 1}{\ln x}}$ .	6. $y(x) = 2 \arccos \sqrt{2x - 1} + \ln 2\sqrt{x^3 - 1} + 3$ .
7. $x(t) = t - 2 \sin t, y(t) = 2 - \cos t$ .	8. $y(x) = \operatorname{arctg} 2x + 3 \cdot \operatorname{sh} \frac{x}{2} \cdot \ln \operatorname{ch} x$ .
9. $y(x) = \frac{\ln 2x + 1}{3x^2 + 5}; y'''(x) = ?$	10. $x(t) = 3 \cos t, y(t) = 2 \sin t; t_0 = \pi / 4$ .
11. $\lim_{x \rightarrow \infty} \frac{x^8 + 4x^3 - 7x + 2}{3x^3 - x^2 + 4x + 1}; \lim_{x \rightarrow 1} (x - 1)e^{\frac{1}{x-1}}; \lim_{x \rightarrow 1} (1 - x) \operatorname{tg} \frac{\pi \cdot x}{2}$ .	
12. $y(x) = \frac{4}{x^2 - 4x + 5}; a = -2, b = -1$ .	13. $y(x) = \frac{4x^3 - 3x}{x^2 - 1}$ .
14. $y(x) = -(x + 1) \exp(x + 2)$ .	

1. $y(x) = \frac{(1 + x^2)\sqrt{1 + x^7}}{x^5}$ .	2. $y(x) = 3 \cdot \sqrt{2^x - 1} + \ln \frac{\sqrt{2^x - 2}}{e^x}$ .
3. $y(x) = \frac{\operatorname{tg} \cos 2 \cdot \sin^3 3x}{1 - \cos 4x}$ .	4. $y(x) = (x \cdot \cos x)^{\ln(x+1)}$ .
5. $y(x) = 2 \cdot \operatorname{arctg} \frac{3}{x} - 2 \cdot \sqrt{x^2 + 5}$ .	6. $y(x) = \frac{(\sin x + \cos 2x \cdot \ln 2) \cdot \exp(x)}{1 + \ln^3 2}$ .
7. $x(t) = \sqrt{t + 1}, y(t) = \frac{1}{\sqrt{t - 1}}$ .	8. $y(x) = \ln(\ln^2 x + \sqrt{1 - x^2})$ .
9. $y(x) = (x + 1) \ln(x^2 + 4); y'''(x) = ?$	10. $x(t) = 2t + t^3, y(t) = t^2 - 1; t_0 = 2$ .
11. $\lim_{x \rightarrow -3} \left[ 2 + \frac{x}{3} \right]^{\operatorname{tg} \frac{\pi \cdot x}{6}}; \lim_{x \rightarrow -1} \frac{\ln(2 + x)}{x + 1}; \lim_{x \rightarrow \infty} x^3 \cdot e^{-x}$ .	
12. $y(x) = \frac{10x + 10}{x^2 + 2x + 2}; a = -2, b = 2$ .	13. $y(x) = \frac{2x^2 - 1}{\sqrt{x^2 - 2}}$ .
14. $y(x) = \frac{\exp(x - 3)}{x - 3}$ .	

1. $y(x) = \frac{x^3}{3 \cdot \sqrt{1-2x^3}}$ .	2. $y(x) = x \cdot \sqrt{\arccos e^x + x^3}$ .
3. $y(x) = \frac{\ln \operatorname{ctg} 5 - \operatorname{sh}^2 3x}{2 \cdot \operatorname{ch} x}$ .	4. $y(x) = (\operatorname{th} 2x)^{\ln x}$ .
5. $y(x) = \arccos x - \ln(2x + \ln \operatorname{tg} \sqrt{x})$ .	6. $y(x) = \operatorname{tg} \frac{\ln \sin x}{\cos x + 2\sqrt{\sin x}}$ .
7. $x(t) = \sqrt[3]{1+t^3}, y(t) = \cos(1+t)$ .	8. $y(x) = \frac{\ln(1+x)}{1+x^2} - \frac{1}{3} \ln \operatorname{tg} \frac{x}{2}$ .
9. $y(x) = (x^2 + 1) \exp(2x); y'''(x) = ?$	10. $x(t) = \arccos \frac{t}{\sqrt{1+t}}, y(t) = \arcsin \frac{t-1}{\sqrt{1+t^2}}; t_0 = 1$ .
11. $\lim_{x \rightarrow \infty} \frac{2^x + x}{x^3}; \lim_{x \rightarrow 2} \frac{\ln 2x - 2 \ln 2}{x^2 - 4}; \lim \left[ 1 + \frac{2x}{3} \right]^{\frac{1}{\operatorname{tg} x}}$ .	
12. $y(x) = \sqrt[3]{2(x-2)^2(5-x)}; a=1, b=5$ .	13. $y(x) = \frac{x^2 - 3}{\sqrt{3x^2 - 2}}$ .
14. $y(x) = \ln \frac{x+6}{x} - 1$ .	

1. $y(x) = \frac{5x^3 - x^2 + x - 1}{2 \cdot \sqrt[3]{x-1}}$ .	2. $y(x) = \sqrt{x} + 2 \ln(x + e^x - \sqrt{x - e^x})$ .
3. $y(x) = \ln(\sqrt{x-2} - \sqrt{x+2}) + \frac{1}{x^3}$ .	4. $y(x) = \operatorname{tg} 4 + 0.5 \frac{\sin^3 3x}{\sin^5 2x}$ .
5. $y(x) = x \cdot \operatorname{arctg} \sqrt{x} - \ln(\sqrt{1 - \operatorname{ch}^2 x} + 1)$ .	6. $y(x) = \frac{1}{2 \operatorname{tg} 3\alpha} \arccos(\sqrt{x} + \operatorname{tg} x)$ .
7. $x(t) = \cos 2t, y(t) = 0.5 \sec^3 t$ .	8. $y(x) = x \cdot \arcsin x + \ln(x - \sqrt{1-x^2})$ .
9. $y(x) = 3x^3 \cdot \exp(2x+5); y''''(x) = ?$	10. $x(t) = \frac{3t+1}{t^2}, y(t) = \cos 2t; t_0 = \pi/3$ .
11. $\lim_{x \rightarrow \infty} (1-x^2) \ln(1+x); \lim_{x \rightarrow 0} (\operatorname{tg} x)^{\operatorname{ctg} x}; \lim_{x \rightarrow 1} \frac{x^\alpha - x}{x^2 - 1}$ .	
12. $y(x) = x + \frac{4}{x} + 5; a=2, b=6$ .	13. $y(x) = \frac{x^4 + 2x^2 - x}{x^3 - 1}$ .
14. $y(x) = -\frac{1}{16} (x+1)^2 (x-3)^2$ .	

1. $y(x) = \frac{1-x^3}{1-x^5} + \frac{1}{1+\sqrt{x}} - \frac{1}{1-\sqrt{x}} + \sqrt{\frac{1-\cos 4x}{1+\cos 4x}}$ .	2. $y(x) = \operatorname{tg} 2 + \operatorname{tg} 2x + \frac{2}{3} \operatorname{tg}^3 2x - \frac{1}{5} \operatorname{tg}^5 2x^2$ .
3. $y(x) = \ln \frac{1+x}{\sqrt{1+x^2}} + 5^{\cos \sqrt{x}} - \operatorname{sh} 5x \cdot \operatorname{ch}^2 x$ .	4. $y(x) = (x+1)^{\frac{1}{x}}$ .
5. $y(x) = \frac{3}{4} \ln \frac{x^2+1}{x^2-1} + 0.5 \operatorname{arctg} e^{x-1}$ .	6. $y(x) = \operatorname{arctg}^3(2x+1) - x \cdot \operatorname{arcsin} \sqrt[3]{x} + 1$ .
7. $x(t) = a(t - \sin 2t), y(t) = a(1 - \cos 2t)$ .	8. $x^3 + \ln y - x^2 \cdot e^y = 0$ .
9. $y(x) = x^2 \sin 2x, y''''(x) = ?$	10. $x(t) = \sqrt{3} \cos t, y(t) = \sin 2t; t_0 = \pi/6$ .
11. $\lim_{x \rightarrow 0} \frac{7^{2x} - 5^{3x}}{2x - \operatorname{arctg} 3x}; \lim_{x \rightarrow \infty} \left[ \frac{x^3 + x + 1}{x^3 + 2} \right]^{2x^2}; \lim_{x \rightarrow 0} \operatorname{ctg} x \cdot \operatorname{ctg} \left( \frac{\pi}{2} - x \right)$ .	
12. $y(x) = x - \sqrt{x+2} + 5; a = -1, b = 8$ .	13. $y(x) = \frac{x^2 - 5}{2x + 3}$ .
14. $y(x) = -\frac{12 \cdot \sqrt[3]{6(x-1)^2}}{x^2 + 2x + 9}$ .	

1. $y(x) = \sqrt[3]{\frac{x(x^2+1)}{\sin^2 x}} - \frac{2}{\sqrt{1-x^2}}$ .	2. $y(x) = 2(\operatorname{tg} \sqrt{x} - \sqrt{x}) + \operatorname{arcsin} \sqrt{1-x^2}$ .
3. $y(x) = \ln \ln(x+1) - 2x^3 \cdot 3^{\sqrt{x}} + \frac{2^5 \cdot e^x}{3^{4x}} + \operatorname{th} 3$ .	4. $y(x) = \operatorname{cth}(\operatorname{tg} x) - \operatorname{th}(\operatorname{ctg} x) + 3 \cdot \operatorname{sh}^2 \frac{x}{15}$ .
5. $y(x) = (x)^{\frac{x}{\ln^2 x}}$ .	6. $y(x) = \ln \sqrt[4]{\frac{x^2+x-1}{x^2-x+1}} + a^2 \cdot \operatorname{arcsin} \frac{x}{a} + 5 \exp(\ln 2x)$ .
7. $x(t) = \ln t^2, y(t) = 2 \sin 2t$ .	8. $x^3 + y^3 - 3xy = 0$ .
9. $y(x) = \exp(-x^2), y''''(x) = ?$	10. $x(t) = \frac{1-t}{t^2}, y(t) = \frac{1+2t}{t}; t_0 = 2$ .
11. $\lim_{x \rightarrow 0} \frac{e^{3x} - e^{-2x}}{2 \operatorname{arcsin} x - \sin x}; \lim_{x \rightarrow \infty} \left[ \frac{x+3}{x-1} \right]^{-x^2}; \lim_{x \rightarrow \pi/3} \frac{1 - \cos 2x}{\pi - 3x}$ .	
12. $y(x) = x + \frac{8}{x^2} + 5; a = 1, b = 5$ .	13. $y(x) = \frac{\sqrt{x^2 + 5x - 1}}{x - 4}$ .
14. $y(x) = \sqrt[3]{x^2(x+2)^2}$ .	

1. $y(x) = \frac{8 - 3 \cdot \sqrt{x^3} + 2x}{1 + 6x\sqrt{x} - 3x^2}$ .	2. $y(x) = \frac{\sin x - \cos x}{\sin x + \cos x} + \operatorname{tg} x^2$ .
3. $y(x) = \operatorname{tg} \left( \frac{x^2}{2} + 1 \right) + \operatorname{tg} 3 + \operatorname{arctg} \frac{x+1}{x-1}$ .	4. $y(x) = 0.5 \ln \operatorname{tg} \frac{x^2}{2} - 2 \ln \frac{\cos x}{2 \sin^2 x}$ .
5. $y(x) = \frac{x^2 \cdot \exp(x^2)}{x^2 + 1} + \sqrt[3]{3}$ .	6. $y(x) = (x^2 + 3)^{\sqrt{x}}$ .
7. $x(t) = 2 \ln \cos t, y(t) = \operatorname{tg} t + \operatorname{ctg} t$ .	8. $y(x) = x^{\sin(2x+1)}$ .
9. $x(t) = \exp t, y(t) = \ln t; d^3 y / dx^3 = ?$	10. $x(t) = at \cos t, y(t) = at \sin t; t_0 = \pi / 4$ .
11. $\lim_{x \rightarrow 0} \frac{e^x + e^{-x} - 2}{\sin^2 x}; \lim_{x \rightarrow \infty} \left[ \frac{3x^2 - 5}{3x^2 - 5x + 7} \right]^{x+1}; \lim_{x \rightarrow 0} \frac{3x^2 - 5x}{\sin 3x}$ .	
12. $y(x) = \frac{x}{1-x^2}; a=0, b=3$ .	13. $y(x) = \frac{x^3 + 4x^2 + 1}{x^2 \sqrt{x^2 - 4}}$ .
14. $y(x) = -(x+1) \exp(x+2)$ .	

1. $y(x) = \frac{(x^2 - 3)^2 \cdot \sqrt[6]{x+1}}{\sqrt[3]{x+7} \cdot \sqrt{x-3}}$ .	2. $y(x) = \sqrt{x + \sqrt{x + \sqrt{x}}}$ .
3. $y(x) = \operatorname{ctg}^2 \frac{x+1}{3} + \operatorname{ctg} \frac{x^2+1}{4} - \arccos \frac{2x}{1+x^2}$ .	4. $y(x) = \frac{\sin x}{2 \cos^2 x} - 0.5 \ln \operatorname{tg} \left( \frac{\pi}{4} + \frac{x}{2} \right) - \operatorname{sh}^2 x^3 + \operatorname{ch} 2x$ .
5. $y(x) = (\ln 2x)^{x^2}$ .	6. $x^4 - 6x^2 y^2 + 9y^4 - 5x^2 - 100 = 0$ .
7. $x(t) = \cos^3 t, y(t) = \sin^3 t$ .	8. $y(x) = e^x \sin x - e^x \cos x$ .
9. $y(x) = x \cdot \sin^2 x; y'''(x) = ?$	10. $x(t) = 2 \ln \operatorname{ctg} t + 1, y(t) = \operatorname{tg} t + \operatorname{ctg} t; t_0 = \pi / 4$ .
11. $\lim_{x \rightarrow -1} \frac{x^3 + 1}{\sin(x+1)}; \lim_{x \rightarrow \infty} \left[ \frac{x^2 - 1}{x^2} \right]^{x^2}; \lim_{x \rightarrow 0} \frac{\sin 4x}{\sqrt{x+1} - 1}$ .	
12. $y(x) = 1 - 2x - \frac{1}{x^2}. a=1, b=4$ .	13. $y(x) = \frac{\sqrt{2x^2 - x}}{x+1}$ .
14. $y(x) = \sqrt[3]{x(x-1)^2}$ .	

1. $y(x) = \frac{2}{7}x \cdot \sqrt{x} - \frac{4}{5}x \cdot \sqrt[3]{x} + \frac{2}{15}x \cdot \sqrt[5]{x}$ .	2. $y(x) = \frac{2}{\sqrt{a^2 - b^2}} \arctg \left[ \sqrt{\frac{a-b}{a+b}} \operatorname{tg} \frac{x}{2} \right] + 3 \operatorname{tg}(\operatorname{tg} x)$ .
3. $y(x) = \ln \sqrt[5]{\frac{x^3 - x + 1}{x^2 + 4x + 1}} - 2^{\cos(x) - \cos^2(x)}$ .	4. $y(x) = \ln^2 \cos^3(4x - 1) - \operatorname{th}(2e^x - 1) + \operatorname{che}^3$ .
5. $y(x) = \left[ \frac{x}{x+1} \right]^x$ .	6. $y^2 x^3 + 5xy + 4 = 0$ .
7. $x(t) = \ln 2t, y(t) = \frac{1}{1-t^2}$ .	8. $y(x) = \sin \left( \frac{\pi}{2} - \arcsin x \right)$ .
9. $y(x) = (x^3 + 3) \exp(x+1), y''''(x) = ?$	10. $x(t) = \arcsin \frac{1}{\sqrt{1+t^2}}, y(t) = \arccos \frac{1}{\sqrt{1+t^2}}; t_0 = 1$ .
11. $\lim_{x \rightarrow \pi/3} \frac{1 - 2 \cos x}{\sin(\pi - 3x)}$ ; $\lim_{x \rightarrow 0} [1 - \ln \cos x]^{\frac{1}{\operatorname{tg}^2 x}}$ ; $\lim_{x \rightarrow 0} \frac{2x \sin x}{1 - \cos x}$ .	
12. $y(x) = x^2 + 2x + \frac{4}{x-1}; a = 2, b = 5$ .	13. $y(x) = \ln \frac{x-3}{x} + 5$ .
14. $y(x) = \frac{x^3 + x^2 - 3x - 1}{2x^2 - 2}$ .	

1. $y(x) = \sqrt{1+x^2} + \ln \left( \frac{1}{x} - \sqrt{1 + \frac{1}{x^2}} \right)$ .	2. $y(x) = \sin \frac{1}{x} \cdot \arcsin \frac{1}{x^2} + \frac{1}{1 + \cos 4x}$ .
3. $y(x) = \frac{x^2 \ln^2 \operatorname{tg} x}{\ln \sin^3 2} + \cos \sqrt{x} \cdot \exp(0.5 \operatorname{tg}^2 x)$	4. $y(x) = \operatorname{arctg} e^{2x} + \ln \sqrt{\frac{e^{2x}}{e^{2x} - 1}} - \sin e^{-x} \cdot \cos e^{-x}$ .
5. $y(x) = \sin(2x - 3y)$ .	6. $y(x) = \frac{x^x}{e^{-x}}$ .
7. $x(t) = t(1 - \sin t), y(t) = t \cdot \cos t$ .	8. $y(x) = \frac{x}{\operatorname{ch} x^2}$ .
9. $y(x) = (1 - 2x^2) \cos x; y''''(x) = ?$	10. $x(t) = 2t - t^2, y(t) = 3t - t^3; t_0 = 1$ .
11. $\lim_{x \rightarrow \pi/4} \frac{\sin x - \cos x}{\ln \operatorname{tg} x}$ ; $\lim_{x \rightarrow \pi} \left[ \operatorname{ctg} \frac{x}{4} \right]^{\frac{1}{\cos \left( \frac{x}{2} \right)}}$ ; $\lim_{x \rightarrow 0} \frac{\operatorname{tg} x - \sin x}{\sin^3 x}$ .	
12. $y(x) = 3 - 3 \ln \frac{x}{x+4}, a = 1, b = 4$ .	13. $y(x) = \frac{3x^4 + 2x^2 + 5x - 1}{2x^3 - 1}$ .
14. $y(x) = \frac{3x^2 - 10}{3 - 2x}$ .	

1. $y(x) = \frac{1}{4\sqrt{2}} \ln \frac{x^2 + x\sqrt{2} - 1}{x^2 - x\sqrt{2} + 1} - \frac{1}{2\sqrt{2}} \operatorname{arctg} \frac{x\sqrt{2}}{1 - x^2}$ .	2. $y(x) = 1 - \exp(\sin^2 3x) \cdot \cos^2 3x + sh^2 x$ .
3. $y(x) = \frac{(1 - x^4)^2 \cdot \sqrt[3]{2 + 6x}}{(0.6x^6 - 0.5)^7 x^5}$	4. $y(x) = (\cos x)^{\sin x}$ .
5. $e^x + e^y - 2^{x \cdot y} - 1 = 0$ .	6. $y(x) = \exp(\operatorname{arctg} \sqrt{x}) \cdot (\sqrt[3]{4x^3 + 2})^2 + \ln^4 \sqrt{\frac{x-1}{x+1}}$ .
7. $x(t) = \ln 2t, y(t) = \sin 2t$ .	8. $y(x) = x^5 \cdot \exp\left(\frac{x}{2}\right) + \cos 2x$ .
9. $y(x) = x^4 \cdot \exp\left(\frac{x}{2}\right); y''''(x) = ?$	10. $x(t) = \frac{1 + \ln t}{t^2}, y(t) = \frac{3 + 2 \ln t}{t}; t_0 = 1$ .
11. $\lim_{x \rightarrow 0} \frac{\exp(\sin 2x) - \exp(\sin x)}{\operatorname{tg} x}$ ; $\lim_{x \rightarrow 3} \left[ \frac{\sin x}{\sin 3} \right]^{\frac{1}{x-3}}$ ; $\lim_{x \rightarrow 0} \frac{\operatorname{arctg} 2x}{\sin 3x}$ .	
12. $y(x) = \frac{3x^2 - 10}{3 - 2x}; a = 1, b = 5$ .	13. $y(x) = \frac{x^2 + 5}{\sqrt[3]{x^6 - 1}}$ .
14. $y(x) = \frac{x^2}{(x-1)^2}$ .	

1. $y(x) = \frac{(x^4 + 3)^3 (x^2 + 1)^7}{\sqrt[3]{x-1}}$ .	2. $y(x) = \sqrt{1 + \sin 2x} - \sqrt{1 - \sin 2x} + \left[ \frac{\sin x}{1 + \cos x} \right]^2$ .
3. $y(x) = \ln \ln x \cdot (\ln \ln \ln x - 1) - 2 \ln(\exp(\arcsin \sqrt{x^2 - 1}))$ .	4. $y(x) = x^2 \cdot \operatorname{ch} \sqrt{x} - \frac{\operatorname{arctg} 5x}{\arcsin 2x}$ .
5. $y(x) = (x^2 + 1)^{2x}$ .	6. $\operatorname{arctg} y - y + x = 0$ .
7. $x(t) = \frac{3t}{1 + t^3}, y(t) = \frac{3t^2}{1 + t^3}$ .	8. $y(x) = \frac{1}{4\sqrt{2}} \ln \frac{x^2 + x\sqrt{2} + 1}{x^2 - x\sqrt{2} + 1}$ .
9. $x(t) = e^{-t}, y(x) = t^3; y''''(x) = ?$	10. $x(t) = 0.5t^2 - 0.25t^4, y(t) = 0.5t^2 + \frac{t^3}{3}; t_0 = 0$ .
11. $\lim_{x \rightarrow 10} \frac{\lg x - 1}{\sqrt{x-9} - 1}$ ; $\lim_{x \rightarrow 1} \left[ \frac{1}{x} \right]^{\frac{\ln(x+1)}{\ln(2-x)}}$ ; $\lim_{x \rightarrow 0} \frac{\sqrt{1 - \cos 4x}}{x}$ .	
12. $y(x) = \frac{3x^2 - 7}{2x + 1}; a = 0, b = 4$ .	13. $y(x) = \frac{x^4 + 3x^2 + x - 5}{4x^3 - x}$ .
14. $y(x) = 2x - 3\sqrt[3]{x^2}$ .	

1. $y(x) = \frac{(x+6)^{10}}{(3x+1)^2 \sqrt{x^3+2x^2+4}}$ .	2. $y(x) = \operatorname{arctg}(x+1) - 2 \ln \frac{x+1}{x^2+2x+2}$ .
3. $y(x) = x^2 + 2 \sin x \cos x \cdot \exp(x) + \cos^2 x$ .	4. $y(x) = \sin \ln x \cdot \cos \ln x - \ln \frac{1}{x}$ .
5. $y(x) = e^x - \sin e^x \cdot \cos^3 e^x - \sin^3 e^x \cdot \cos e^x$ .	6. $y(x) = (\cos x)^{\frac{1}{x}}$ .
7. $x(t) = t^3 + 3t + 1, y(t) = 3t^5 + 5t^3 + 1$ .	8. $y(x) = 0.5(x^2 - 1) \operatorname{arctg} x + 0.5x$ .
9. $y(x) = \frac{1}{x^2(x-1)}$ ; $y'''(x) = ?$	10. $x(t) = \frac{1+t^2}{t^2-1}, y(t) = \frac{t}{t^2-1}; t_0 = 2$ .
11. $\lim_{x \rightarrow 0} \frac{\sqrt{\cos x} - 1}{\sin^2 2x}$ ; $\lim_{x \rightarrow 1} \left[ \frac{2-x}{x} \right]^{\frac{1}{\ln(2-x)}}$ ; $\lim_{x \rightarrow 4} \frac{2^x - 16}{\sin(\pi \cdot x)}$ .	
12. $y(x) = 2 \ln x + x^2 - 4x + 3; a = 1, b = 3$ .	13. $y(x) = \frac{2x^2 + 7}{7x - 1}$ .
14. $y(x) = 6x - 6 - 9\sqrt[3]{(x-1)^2}$ .	

1. $y(x) = \frac{(x+2)^2}{(x+1)^3(x+3)^4}$ .	2. $y(x) = \ln \frac{\sqrt{5} + \operatorname{tg} \frac{x}{2}}{\sqrt{5} - \operatorname{tg} \frac{x}{2}} + 2 \ln(\sin \sqrt{x} \cdot \operatorname{tg} \sqrt{x}) - \sqrt{x}$ .
3. $y(x) = \frac{x \cdot \sin x}{1 + \operatorname{tg} x} + \operatorname{arctg} \frac{2x}{1 - x^2}$ .	4. $y(x) = 3x \cdot \sin^3 x + 3 \cos x - \cos^3 x + ch^3 4x + sh^3 \sqrt{x}$
5. $y(x) = \sqrt[3]{2x \cdot \sin x + 1}$ .	6. $x^2 y + \operatorname{arctg} \frac{y}{x} = 0$ .
7. $x(t) = \sqrt{t}, y(t) = \sqrt[3]{t}$ .	8. $y(x) = \frac{x - \exp(2x)}{x + \exp(2x)}$ .
9. $y(x) = \arcsin x; y'''(x) = ?$	10. $x(t) = \ln(1+t^2), y(t) = t - \operatorname{arctg} t; y_0 = 1$ .
11. $\lim_{x \rightarrow 0} \frac{\sin 2x - 2 \sin x}{x \cdot \ln \cos 5x}$ ; $\lim_{x \rightarrow \pi/4} [\operatorname{tg} x]^{\operatorname{ctg} 4x}$ ; $\lim_{x \rightarrow 1} \frac{x^2 - 1}{\ln x}$ .	
12. $y(x) = x^2 - 4x - (x-2) \ln(x-1); a = 2, b = 4$ .	13. $y(x) = \frac{x^2 + 3}{\sqrt{x^2 - 1}}$ .
14. $y(x) = -(x^2 - 4)^2$ .	



1. $y(x) = \frac{(x-2)^9}{\sqrt{(x-1)^5(x-3)^{11}}}$ .	2. $y(x) = \ln \frac{2 \ln^2 \sin x + 3}{2 \ln^2 \sin x - 3}$ .
3. $y(x) = \frac{a^x}{1+a^{2x}} - \frac{1-a^{2x}}{1+a^{2x}} \operatorname{arctg}(a^{-x})$ .	4. $y(x) = x^{x^3}$ .
5. $y(x) = \sqrt{\frac{1}{1+\sqrt{1+x^2}}} - \ln \sqrt{1+\operatorname{ctg}^2 x}$ .	6. $y(x) = x \cdot \arccos x - \sqrt{1-x^2} + \operatorname{arctg} \sqrt{2}$ .
7. $x(t) = \frac{2}{3} t \sqrt{t}, y(t) = \sqrt{t} \cdot \exp(\sqrt{t})$ .	8. $y(x) = \ln \sqrt{1+\operatorname{ctg}^2 x}$ .
9. $y(x) = \operatorname{arctg} x; y'''(x) = ?$	10. $x(t) = \frac{t+1}{t}, y(t) = \frac{t-1}{t}; t_0 = -1$ .
11. $\lim_{x \rightarrow 1} \frac{1-x}{\log_2 x}; \lim_{x \rightarrow 2\pi} [\cos x]^{\frac{1}{\sin^2 2x}}; \lim_{x \rightarrow -2} \frac{\sqrt[3]{x-6} + 2}{(x+2)^3}$ .	
12. $y(x) = \frac{\exp(2-x)}{2-x}; a = -1, b = 1$ .	13. $y(x) = \frac{x^2 - 2x + 5}{x(x-1)}$ .
14. $y(x) = 1 - \sqrt[3]{x^2 + 2x}$ .	

1. $y(x) = \ln \frac{\sqrt[4]{x^2 + 3x + 1}}{\sqrt[3]{x^2 + 4}}$ .	2. $y(x) = 0.5 \operatorname{tg}^3(\sin x) + \ln \cos(\sin x) + \exp(\sin x^2)$ .
3. $y(x) = \arcsin \frac{\sin x}{\sqrt{1+\sin^2 x}} + \frac{1+\sin^2 x}{\cos x}$ .	4. $y(x) = x^2 \cdot \exp(x^2) - \ln \operatorname{ch} \sqrt{x} + \frac{2x}{\ln 2}$ .
5. $y(x) = x^{\ln x}$ .	6. $y(x) = \sqrt[3]{x^2} \frac{1-x}{1+x^2} \cos x - \sin^3 x \cos^2 x$ .
7. $x(t) = \operatorname{cht}, y(t) = \operatorname{sht}$ .	8. $\exp(x) \cdot \sin y - \exp(-y) \cdot \cos x = 0$ .
9. $y(x) = \exp(x^2) \cdot \sin x; y'''(x) = ?$	10. $x(t) = 1 - t^2, y(t) = t - t^3; t_0 = 2$ .
11. $\lim_{x \rightarrow 0} \frac{\sqrt{x+2} - \sqrt{2}}{\sin 3x}; \lim_{x \rightarrow \pi/2} [1 + \cos 3x]^{\sec \frac{\pi}{2}}; \lim_{x \rightarrow 16} \frac{\sqrt[4]{x} - 2}{\sqrt{x} - 4}$ .	
12. $y(x) = 2 \ln \frac{x}{x+1} - 1. a = 1, b = 4$ .	13. $y(x) = \frac{x-16}{\sqrt{x^2-8}}$ .
14. $y(x) = 1 - \sqrt[3]{x^2 + 2x}$ .	

1. $y(x) = x \cdot \sqrt[3]{\frac{x(x-1)}{x-2}}$ .	2. $y(x) = x \cdot \sin 3x \cos \frac{x}{5} + 0.5 \cos^2 x$ .
3. $y(x) = \sqrt{2x+1}[\ln(2x+1) - 2x] + \arccos(2x \cdot \sqrt{1-x^2})$ .	4. $y(x) = \ln \frac{\operatorname{tg} \frac{x}{2} - 1 + \sqrt{2}}{\operatorname{tg} \frac{x}{2} - 1 - \sqrt{2}} + 9 \ln \sqrt[9]{\frac{x(x-1)}{x+2}}$ .
5. $y(x) = x^{\sin(x+1)}$ .	6. $\ln x + \exp\left(\frac{-y}{x}\right) = 2$ .
7. $x(t) = \frac{2at}{1+t^2}, y(t) = \frac{a(1-t^2)}{1+t^2}$ .	8. $y(x) = \arccos \sqrt{1-2^x}$ .
9. $y(x) = \frac{1-\cos x}{\sin x}; y'''(x) = ?$	10. $x(t) = t(1-\sin t), y(t) = t \cos t; t_0 = 0$ .
11. $\lim_{x \rightarrow 0} \frac{1-\sqrt{\cos x}}{1-\cos \sqrt{x}}; \lim_{x \rightarrow \pi/2} \left[ \operatorname{tg} x \frac{x}{2} \right]^{\frac{\pi}{2}-x}; \lim_{x \rightarrow 4} \frac{\sqrt{x}-2}{\sqrt[3]{x^2}-16}$ .	
12. $y(x) = \frac{x^2+4}{x^2}, a=1, b=4$ .	13. $y(x) = \frac{8x-x^2}{\sqrt[3]{x^3-1}}$ .
14. $y(x) = \frac{(x+1)^2}{(x-1)^2}$ .	

1. $y(x) = \frac{\sqrt{x-1}}{\sqrt[3]{(x+2)^2} \sqrt{(x+3)^3}}$ .	2. $y(x) = 2 \cos(3x-1) \sin 2x + \cos(3x^2-1) + \sin 4$ .
3. $y(x) = \operatorname{arctg} \frac{x \cdot \sin x}{1-x \cdot \cos x}$ .	4. $y(x) = 3 \sin(xe^x - e^x) - \sin^3(xe^x - e^x) + \sqrt{1+\operatorname{sh}^2 4x}$ .
5. $y(x) = (\sin x)^{\operatorname{tg} x}$ .	6. $y(x) = \frac{1}{6} \ln \frac{(x+1)^2}{x^2-x+1} + \frac{1}{\sqrt{3}} \operatorname{arctg} \frac{2x-1}{\sqrt{3}}$ .
7. $x(t) = \sqrt{t^2+1}, y(t) = \frac{t-1}{\sqrt{t^2+1}}$ .	8. $y(x) = \sqrt{1+\arcsin x}$ .
9. $y(x) = (x^2-5x^3) \sin 2x; y'''(x) = ?$	10. $x(t) = t^3+1, y(t) = t^2+t+1; t_0 = 1$ .
11. $\lim_{x \rightarrow 1} \frac{xe^x - e}{\sin(x^2-1)}; \lim_{x \rightarrow 3} \left[ \frac{9-2x}{3} \right]^{\operatorname{tg} \frac{\pi-x}{6}}; \lim_{x \rightarrow -8} \frac{\sqrt{1-x}-3}{(2+\sqrt[3]{x})^2}$ .	
12. $y(x) = \sqrt[3]{x(x-3)}; a=-1, b=4$	13. $y(x) = \frac{\sqrt[3]{x^2-1} \cdot \sqrt[3]{x+5}}{2}$ .
14. $y(x) = \sqrt[3]{x(x-1)^2}$ .	

1. $y(x) = \sqrt[3]{\frac{x(x^2+1)}{(x^2-1)^3}} + \sqrt[3]{1+x\sqrt{x+3}}$ .	2. $y(x) = \arccos \frac{2x-1}{\sqrt{3}} - 0.5 \arcsin \frac{x}{\sqrt{1+x^2}}$ .
3. $y(x) = \operatorname{tg} \frac{x^2+1}{2} + \frac{\sin x + \cos x}{\sin x - \cos x} + \exp(\sin \sqrt{1+x})$ .	4. $y(x) = \ln^3 \cos \frac{x-1}{x} + \sqrt[3]{\ln \sin \frac{x+3}{4}} - \ln \operatorname{ch} x$ .
5. $y(x) = x^{\pi/x}$ .	6. $\cos^2(x+y) = 1$ .
7. $x(t) = \ln(1+t^2), y(t) = \operatorname{arctg} t^2$ .	8. $x(t) = t^2 + 2, y(t) = \frac{t^3}{3-t}$ .
9. $y(x) = x^6 \cdot 5^{\sqrt{1-x^4}}; y'''(x) = ?$	10. $x(t) = 2\operatorname{tg} t, y(t) = 2 \sin^2 t + \sin 2t; t_0 = \pi/4$ .
11. $\lim_{x \rightarrow 3} \frac{\log_3 x - 1}{\operatorname{tg}(\pi \cdot x)}$ ; $\lim_{x \rightarrow \alpha} \left[ \frac{\sin x}{\sin \alpha} \right]^{\frac{1}{x-\alpha}}$ ; $\lim_{x \rightarrow \infty} \frac{(3-x)^3}{(x+1)^2 - (x+1)^3}$ .	
12. $y(x) = \exp(\sqrt{2} \cos x); a = -\pi/2; b = \pi/2$ .	13. $y(x) = \ln\left(\frac{1}{x}\right) - x$ .
14. $y(x) = \frac{x^2(x-4)^2}{16}$ .	

1. $y(x) = \frac{2x^2}{\sqrt{1+2x^3}} - 4 \cdot \sqrt[3]{5x^2 - \sqrt{3}}$ .	2. $y(x) = \frac{x}{\sin^2 3x + \cos^2 2x} + \operatorname{tg}^3 \frac{x+1}{2} \operatorname{ctg}^5 5x$ .
3. $y(x) = \ln \sqrt{\ln x + 1} + \ln^2(\sqrt{x} + 1) + \sin x \cdot \exp(\cos x)$ .	4. $y(x) = \frac{(\operatorname{tg}^2 x - 1)(\operatorname{tg}^4 x + 10\operatorname{tg}^2 x + x^2)}{3\operatorname{tg}^3 x}$ .
5. $y(x) = (\operatorname{arctg} x)^{3x}$ .	6. $\operatorname{arctg} \frac{y}{x} = 0.5 \ln(x^2 + y^2)$ .
7. $x(t) = 1 + \exp(5t^2), y(t) = 5t^2 - \exp(-5t^2)$ .	8. $y(x) = 5^{-x^2} \cdot \arcsin 5^{x^2}$ .
9. $y(x) = \frac{x}{x^2-1}; y'''(x) = ?$	10. $x(t) = \sin t, y(t) = a^t; t_0 = 0$ .
11. $\lim_{x \rightarrow 0} \frac{1+x \cdot \sin x - \cos 2x}{\sin^2 x}$ ; $\lim_{x \rightarrow 1} \left( \frac{3x-1}{x+1} \right)^{-(x-1)}$ ; $\lim_{x \rightarrow \infty} \frac{8x^3 - 2x}{(x+1)^4 - (x-1)^4}$ .	
12. $y(x) = \sqrt[3]{\sin x}; a = 0, b = \pi$ .	13. $y(x) = \frac{x^2 - 2x + 5}{x-3}$ .
14. $y(x) = 2 \ln \frac{x}{x+1} - 1$ .	

