

Oblicz pochodną funkcji:

1. $f(x) = x^5,$

$$f'(x) = 5x^4$$

2. $f(x) = x^4 + x^3 - x,$

$$f'(x) = 4x^3 + 3x^2 - 1$$

3. $f(x) = 3x^2 + x,$

$$f'(x) = 6x + 1$$

4. $f(x) = -3x^2 + x - 1,$

$$f'(x) = -6x + 1$$

5. $f(x) = 2x^2 - x^{-3},$

$$f'(x) = 4x + 3x^{-4}$$

6. $f(x) = 5x^2 - x^{-2},$

$$f'(x) = 10x + 2x^{-3}$$

7. $f(x) = 5x^3 - \cos x,$

$$f'(x) = 15x^2 + \sin x$$

8. $f(x) = 4x^2 + x - 3,$

$$f'(x) = 8x + 1$$

9. $f(x) = -x^3 + 3x^2 - x,$

$$f'(x) = -3x^2 + 6x - 1$$

10. $f(x) = x^{-2} + x^{-1} - 5x + 9,$

$$f'(x) = -2x^{-3} - x^{-2} - 5$$

11. $f(x) = 4x^3 + x - \sqrt[3]{x} - 3,$

$$f'(x) = 12x^2 + 1 - \frac{1}{3}x^{-\frac{2}{3}}$$

12. $f(x) = x^4 - x^2 + x,$

$$f'(x) = 4x^3 - 2x + 1$$

13. $f(x) = -4x^2 + x - 1,$

$$f'(x) = -8x + 1$$

14. $f(x) = 4\pi \cdot x^2,$

$$f'(x) = 8\pi \cdot x$$

15. $f(x) = \frac{4}{3}\pi \cdot x^3,$

$$f'(x) = 4\pi \cdot x^2$$

16. $f(x) = -\sin x + 3x^2 - 8,$

$$f'(x) = -\cos x + 6x$$

17. $f(x) = x^4 + \cos(x),$

$$f'(x) = 4x^3 - \sin(x)$$

18. $f(x) = \sin(x) - \cos(x),$

$$f'(x) = \cos(x) + \sin(x)$$

19. $f(x) = \ln(x) + 7,$

$$f'(x) = \frac{1}{x}$$

20. $f(x) = 7e^x + x,$

$f'(x) = 7e^x + 1$

21. $f(x) = \arcsin(x) + \sin(x),$

$f'(x) = \frac{1}{\sqrt{1-x^2}} + \cos(x)$

22. $f(x) = \sqrt[3]{x} + \arcsin x,$

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

23. $f(x) = \sqrt[4]{x} + \arccos x,$

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

24. $f(x) = \ln(x) + \operatorname{arctg}(x),$

$f'(x) = \frac{1}{x} + \frac{1}{1+x^2}$

25. $f(x) = 5^x + 8,$

$f'(x) = 5^x \cdot \ln(5)$

26. $f(x) = 7x^{\frac{2}{3}} - x + 11,$

$f'(x) = \frac{14}{3}x^{-\frac{1}{3}} - 1$

27. $f(x) = x^{\frac{2}{5}} + \left(\frac{2}{5}\right)^x,$

$f'(x) = \frac{2}{5}x^{-\frac{3}{5}} + \left(\frac{2}{5}\right)^x \cdot \ln\left(\frac{2}{5}\right)$

28. $f(x) = 4x^7 + \cos(x) - 3^x,$

$f'(x) = 28x^6 - \sin(x) - 3^x \cdot \ln(3)$

29. $f(x) = \frac{1}{x} + 11,$

$f'(x) = -x^{-2}$

30. $f(x) = \log_2(x),$

$f'(x) = \frac{1}{x \ln 2}$

31. $f(x) = \log_{10}(x),$

$f'(x) = \frac{1}{x \ln 10}$

32. $f(x) = x \cdot \sin x,$

$f'(x) = \sin x + x \cdot \cos x$

33. $f(x) = x^2 \cdot \sin x,$

$f'(x) = 2x \cdot \sin x + x^2 \cdot \cos x$

34. $f(x) = x^3 \cdot \cos x,$

$f'(x) = 3x^2 \cdot \cos x - x^3 \cdot \sin x$

35. $f(x) = x \cdot \operatorname{arctg} x,$

$f'(x) = \operatorname{arctg} x + \frac{x}{1+x^2}$

36. $f(x) = x \cdot \operatorname{arctg} x + x^2$

$f'(x) = \operatorname{arctg} x + \frac{x}{1+x^2} + 2x$

37. $f(x) = x^2 \cdot \operatorname{arctg} x,$

$f'(x) = 2x \cdot \operatorname{arctg} x + \frac{x^2}{1+x^2}$

38. $f(x) = x^2 \cdot \arcsin x,$

$f'(x) = 2x \cdot \arcsin x + \frac{x^2}{\sqrt{1-x^2}}$

39. $f(x) = x^3 \cdot \arccos x,$

$f'(x) = 3x^2 \cdot \arccos x - \frac{x^3}{\sqrt{1-x^2}}$

40. $f(x) = x^2 \cdot \ln x,$

$f'(x) = x \cdot (1 + 2 \cdot \ln x)$

41. $f(x) = 2x^3 \cdot \ln x,$

$f'(x) = 2x^2 \cdot (1 + 3 \cdot \ln x)$

42. $f(x) = x^4 \cdot \ln x,$

$f'(x) = x^3 \cdot (1 + 4 \cdot \ln x)$

43. $f(x) = x \cdot \sin(x) + x,$

$f'(x) = \sin(x) + x \cdot \cos(x) + 1$

44. $f(x) = x \cdot \ln(x) - 8,$

$f'(x) = 1 + \ln x$

45. $f(x) = \cos(x) \cdot \sin(x),$

$f'(x) = \cos^2 x - \sin^2 x$

46. $f(x) = 3x^2 \cdot \cos(x),$

$f'(x) = 6x \cdot \cos(x) - 3x^2 \cdot \sin(x)$

47. $f(x) = x^3 \cdot \arcsin(x) + x,$

$f'(x) = 3x^2 \cdot \arcsin(x) + \frac{x^3}{\sqrt{1-x^2}} + 1$

48. $f(x) = (1+x^2) \cdot \operatorname{arctg}(x),$

$f'(x) = 1 + 2x \cdot \operatorname{arctg} x$

49. $f(x) = \sin^2(x),$

$f'(x) = 2 \cdot \sin x \cdot \cos x$

50. $f(x) = \cos^2(x),$

$f'(x) = -2 \cdot \sin x \cdot \cos x$

51. $f(x) = \cos^3(x),$

$f'(x) = -3 \cdot \sin x \cdot \cos^2 x$

52. $f(x) = (1+x) \cdot \sin(x),$

$f'(x) = \sin x + (1+x) \cdot \cos x$

53. $f(x) = \frac{x^2 - 8}{x + 2},$

$f'(x) = \frac{(x+2)^2 + 4}{(x+2)^2}$

54. $f(x) = \frac{x^2 - 4}{x + 1}$, $f'(x) = \frac{(x+1)^2 + 3}{(x+1)^2}$
55. $f(x) = \frac{x^3 + 7x^2 - 8}{2x - 1}$, $f'(x) = \frac{(3x^2 + 14x) \cdot (2x - 1) - (x^3 + 7x^2 - 8) \cdot 2}{(2x - 1)^2}$
56. $f(x) = \frac{x^2 + x + 1}{x^3 + 2}$, $f'(x) = \frac{(2x + 1) \cdot (x^3 + 2) - (x^2 + x + 1) \cdot 3x^2}{(x^3 + 2)^2}$
57. $f(x) = \operatorname{tg}(x)$, $f'(x) = \frac{1}{\cos^2(x)}$
58. $f(x) = \operatorname{ctg}(x)$, $f'(x) = \frac{-1}{\sin^2 x}$
59. $f(x) = \frac{e^x}{x}$, $f'(x) = \frac{e^x \cdot (x - 1)}{x^2}$
60. $f(x) = \frac{x}{e^x}$, $f'(x) = \frac{1 - x}{e^x}$
61. $f(x) = \frac{\ln(x)}{x}$, $f'(x) = \frac{1 - \ln x}{x^2}$
62. $f(x) = x^{-2} \cdot \cos(x)$, $f'(x) = -2x^{-3} \cdot \cos(x) - x^{-2} \cdot \sin(x)$
63. $f(x) = \frac{\sin(x)}{x}$, $f'(x) = \frac{x \cos x - \sin x}{x^2}$
64. $f(x) = \frac{\cos x}{x}$, $f'(x) = -\frac{x \sin x + \cos x}{x^2}$
65. $f(x) = \frac{\cos x}{2x}$, $f'(x) = -\frac{x \sin x + \cos x}{2x^2}$
66. $f(x) = \frac{\ln x}{x^2 + 1}$, $f'(x) = \frac{\frac{x^2 + 1}{x} - 2x \ln x}{(x^2 + 1)^2}$
67. $f(x) = \frac{\ln x}{-x + 1}$, $f'(x) = \frac{\frac{-x + 1}{x} + \ln x}{(-x + 1)^2}$

68. $f(x) = \frac{3x^4 + 2}{\cos x}$, $f'(x) = \frac{12x^3 \cdot \cos x + (3x^4 + 2) \cdot \sin x}{\cos^2 x}$
69. $f(x) = \frac{x^3 + 2x}{\sin x}$, $f'(x) = \frac{(3x^2 + 2) \cdot \sin x - (x^3 + 2x) \cdot \cos x}{\sin^2 x}$
70. $f(x) = \frac{\log_{10}(x)}{x^2}$, $f'(x) = \frac{\log_{10}(e) - 2 \cdot \log_{10}(x)}{x^3}$
71. $f(x) = x + \sin(3x)$, $f'(x) = 1 + 3\cos(3x)$
72. $f(x) = -2 + \sin(4x)$, $f'(x) = 4\cos(4x)$
73. $f(x) = \sqrt{1+x^3}$, $f'(x) = \frac{3x^2}{2} \cdot \frac{1}{\sqrt{1+x^3}}$
74. $f(x) = \sqrt[3]{x^4 + x^3 - x}$, $f'(x) = \frac{1}{3} \cdot (x^4 + x^3 - x)^{-\frac{2}{3}} \cdot (4x^3 + 3x^2 - 1)$
75. $f(x) = \sin(x) - \frac{1}{2} \cdot \cos^2(x)$, $f'(x) = \cos(x) \cdot (1 + \sin(x))$
76. $f(x) = \frac{x \cdot \ln(x)}{x-2}$, $f'(x) = \frac{(1 + \ln x) \cdot (x-2) - x \cdot \ln(x)}{(x-2)^2}$
77. $f(x) = \frac{x^2 \cdot \ln(x)}{x-1}$, $f'(x) = \frac{(2 \cdot \ln x + 1) \cdot x \cdot (x-1) - x^2 \cdot \ln x}{(x-1)^2}$
78. $f(x) = \ln(x+1)$, $f'(x) = \frac{1}{x+1}$
79. $f(x) = \ln(4x)$, $f'(x) = \frac{1}{x}$
80. $f(x) = \ln(5x)$, $f'(x) = \frac{1}{x}$
81. $f(x) = \ln(x^2 + 1)$, $f'(x) = \frac{2x}{x^2 + 1}$
82. $f(x) = \ln(x^2 + 8)$, $f'(x) = \frac{2x}{x^2 + 8}$

83. $f(x) = \log_6(x^2)$, $f'(x) = \frac{2}{x \ln 6}$
84. $f(x) = \log_8(\sin x)$, $f'(x) = \frac{\operatorname{ctg} x}{\ln 8}$
85. $f(x) = \frac{\log_{10}(x)}{x^2 + 1}$, $f'(x) = \frac{\frac{x^2 + 1}{x \cdot \ln 10} - 2x \cdot \log_{10} x}{(x^2 + 1)^2}$
86. $f(x) = \sin(3x)$, $f'(x) = 3 \cdot \cos(3x)$
87. $f(x) = \sin(x^2)$, $f'(x) = 2x \cdot \cos(x^2)$
88. $f(x) = \sin(x^3)$, $f'(x) = 3x^2 \cos(x^3)$
89. $f(x) = \cos(x^4)$, $f'(x) = -4x^3 \sin(x^4)$
90. $f(x) = \arcsin(x^3)$, $f'(x) = \frac{3x^2}{\sqrt{1 - x^6}}$
91. $f(x) = \operatorname{arctg}(x^2)$, $f'(x) = \frac{2x}{1 + x^4}$
92. $f(x) = \operatorname{arctg}(x^3)$, $f'(x) = \frac{3x^2}{1 + x^6}$
93. $f(x) = \sin^2(x^5) + 2$, $f'(x) = 10x^4 \cdot \sin(x^5) \cdot \cos(x^5)$
94. $f(x) = \log_5(x^3)$, $f'(x) = \frac{3}{x \cdot \ln 5}$
95. $f(x) = \log_{10}(x^4)$, $f'(x) = \frac{4}{x \cdot \ln 10}$
96. $f(x) = x \cdot \ln(x^2 + x - 1)$, $f'(x) = \ln(x^2 + x - 1) + x \cdot (2x + 1) \cdot \frac{1}{x^2 + x - 1}$
97. $f(x) = x \cdot \ln(x^2 + 2x + 4)$, $f'(x) = \ln(x^2 + 2x + 4) + \frac{2x \cdot (x + 1)}{x^2 + 2x + 4}$
98. $f(x) = e^{x+1}$, $f'(x) = e^{x+1}$

99. $f(x) = e^{5x}$, $f'(x) = 5 \cdot e^{5x}$
100. $f(x) = e^{x^2}$, $f'(x) = 2x \cdot e^{x^2}$
101. $f(x) = e^{x^2+1}$, $f'(x) = 2x \cdot e^{x^2+1}$
102. $f(x) = e^{-x^2+2}$, $f'(x) = -2x \cdot e^{-x^2+2}$
103. $f(x) = e^{x^2+2x}$, $f'(x) = 2 \cdot (x+1) \cdot e^{x^2+2x}$
104. $f(x) = x \cdot e^x$, $f'(x) = e^x \cdot (1+x)$
105. $f(x) = x \cdot e^{5x}$, $f'(x) = e^{5x} \cdot (1+5x)$
106. $f(x) = e^{x^2} \cdot \ln(x^2+x-1)$, $f'(x) = 2x \cdot e^{x^2} \cdot \ln(x^2+x-1) + e^{x^2} \cdot \frac{(2x+1)}{(x^2+x-1)}$
107. $f(x) = \arctg(e^x)$, $f'(x) = \frac{e^x}{1+e^{2x}}$
108. $f(x) = \arccos(\sin(x))$, $f'(x) = -1$
109. $f(x) = \log_6(\sin(x))$, $f'(x) = \frac{\text{ctg}(x)}{\ln 6}$
110. $f(x) = \sin^2(x^3)$, $f'(x) = 6x^2 \cdot \sin(x^3) \cdot \cos(x^3)$
111. $f(x) = \sin^3(e^x)$, $f'(x) = 3e^x \cdot \sin^2(e^x) \cdot \cos(e^x)$
112. $f(x) = \sin^2(e^x)$, $f'(x) = 2e^x \cdot \sin(e^x) \cdot \cos(e^x)$
113. $f(x) = \sqrt[4]{\ln(3x)}$, $f'(x) = \frac{1}{4x} \cdot (\ln(3x))^{-\frac{3}{4}}$
114. $f(x) = \sqrt[3]{\sin(2x)}$, $f'(x) = \frac{2}{3} \cdot (\sin(2x))^{-\frac{2}{3}} \cdot \cos(2x)$
115. $f(x) = x^{2\sin x}$, $f'(x) = 2e^{2\sin x \cdot \ln x} \cdot \left(\cos x \cdot \ln x + \frac{\sin x}{x} \right)$
116. $f(x) = x^{-2\cos x}$, $f'(x) = 2e^{-2\cos x \cdot \ln x} \cdot \left(\sin x \cdot \ln x - \frac{\cos x}{x} \right)$