- $f(x) = c \implies f'(x) = 0$
- $f(x) = ax \implies f'(x) = a$
- $f(x) = ax + b \implies f'(x) = a$
- $f(x) = ax^2 + bx + c \implies f'(x) = 2ax + b$
- $f(x) = ax^3 \implies f'(x) = 3ax^2$
- $f(x) = ax^n \implies f'(x) = nax^{n-1}, n \in \mathbb{N}$
- $f(x) = f_1(x) + f_2(x) \implies f'(x) = f_1'(x) + f_2'(x)$
- $f(x) = f_1(x) \cdot f_2(x) \implies f'(x) = f_1'(x) \cdot f_2(x) + f_1(x) \cdot f_2'(x)$
- $f(x) = f_1(x) \cdot f_2(x) \cdot f_3'(x) \implies$
  $f'(x) = f_1'(x) \cdot f_2(x) \cdot f_3(x) + f_1(x) \cdot f_2'(x) \cdot f_3(x) + f_1(x) \cdot f_2(x) \cdot f_3'(x)$
- $f(x) = \dfrac{f_1(x)}{f_2(x)} \implies f'(x) = \dfrac{f_1'(x) \cdot f_2'(x) - f_1(x) \cdot f_2'(x)}{f_2(x)^2}$
- $f(x) = (f_1(x))^n \implies f'(x) = n \cdot (f_1(x))^{n-1} \cdot f'(x), n \in \mathbb{Q}$
- $f(x) = \sqrt{x} \implies f'(x) = \dfrac{1}{2\sqrt{x}}$
- $f(x) = \sqrt[3]{x} \implies f'(x) = \dfrac{1}{3\sqrt[3]{x^2}}$
- $f(x) = \sqrt[n]{x} \implies f'(x) = \dfrac{1}{n\sqrt[n]{x^{n-1}}}$
- $f(x) = \sqrt[n]{f_1(x)} \implies f'(x) = \dfrac{1}{n\sqrt[n]{f_1(x)^{n-1}}} f_1'(x)$

1. $f(x) = \dfrac{x^3}{2} - \dfrac{x^4}{3} + 8x$
2. $f(x) = \dfrac{3}{x^2}$
3. $f(x) = (3 + 2x + 5x^2)^2$
4. $f(x) = \dfrac{3x}{x^2 - 8}$
5. $f(x) = \sqrt{3 - 2x}$
6. $f(x) = \dfrac{10}{(x-1)^4}$
7. $f(x) = \sqrt[3]{x^3 - 2}$
8. $f(x) = \sqrt{x} \cdot (x+1)^3$
9. $f(x) = \dfrac{\sqrt[3]{x^2}}{x - 1}$

10. $f(x) = \sqrt[4]{(x+1)^3}$

- $f(x) = a \cdot f_1(x) \implies f'(x) = a \cdot f_1'(x)$
- $f(x) = f_1(f_2(x)) \implies f'(x) = f_1'(f_2(x)) \cdot f_2'(x)$
- $f(x) = f_1(f_2(f_3(x))) \implies f'(x) = f_1'(f_2(f_3(x))) \cdot f_2'(f_3(x)) \cdot f_3'(x)$
- $f(x) = \ln x \implies f'(x) = \dfrac{1}{x}$
- $f(x) = \ln f(x) \implies f'(x) = \dfrac{1}{f(x)} \cdot f'(x)$
- $f(x) = \log x \implies f'(x) = \dfrac{1}{x} \log e, \qquad \log e = 0,4343$
- $f(x) = \log f(x) \implies f'(x) = \dfrac{1}{f(x)} \cdot \log e \cdot f'(x)$
- $f(x) = \log_b x \implies f'(x) = \dfrac{1}{x} \log_b e, \qquad \log e = 0,4343$
- $f(x) = \log_b f(x) \implies f'(x) = \dfrac{1}{f(x)} \cdot \log_b e \cdot f'(x)$
- $f(x) = e^x \implies f'(x) = e^x$
- $f(x) = e^{f(x)} \implies f'(x) = e^{f(x)} \cdot f'(x)$
-
- $f(x) = 10^x \implies f'(x) = 10^x \cdot \ln 10$
- $f(x) = 10^{f(x)} \implies f'(x) = 10^{f(x)} \cdot \ln 10 \cdot f'(x)$
- $f(x) = a^x \implies f'(x) = a^x \cdot \ln a$
- $f(x) = a^{f(x)} \implies f'(x) = a^{f(x)} \cdot \ln a \cdot f'(x)$
- $f(x) = f_1(x)^{f_2(x)} \implies$
  $f'(x) = f_2(x) \cdot f_1(x)^{f_2(x)-1} \cdot f_1'(x) + f_1(x)^{f_2(x)} \cdot \ln f_1(x) \cdot f_2'(x)$

11. $f(x) = \log\left(x^3 + \dfrac{1}{x}\right)$

12. $f(x) = e^{-\frac{x^2}{4}}$

13. $f(x) = e^{x^2}(x^3 + 3)$

14. $f(x) = \ln \sqrt[3]{x^5}$

15. $f(x) = \log^2(x^2 + 3)$

16. $f(x) = (\sin x)^x$

17. $f(x) = \log_2 \dfrac{x^4}{x^2 + 1}$

18. $f(x) = \ln^3(x^2 + x + 1)$

19. $f(x) = \log_5(5 - x)^6$

- $f(x) = \sin x \implies f'(x) = \cos x$
- $f(x) = \sin f(x) \implies f'(x) = (\cos f(x)) \cdot f'(x)$
- $f(x) = \cos x \implies f'(x) = -\sin x$
- $f(x) = \cos f(x) \implies f'(x) = (-\sin f(x)) \cdot f'(x)$
- $f(x) = \operatorname{tg} x \implies f'(x) = 1 + \operatorname{tg}^2 x = \dfrac{1}{\cos^2 x}$
- $f(x) = \operatorname{tg} f(x) \implies f'(x) = 1 + \operatorname{tg}^2 f(x) \cdot f'(x) = \dfrac{1}{\cos^2 f(x)} f'(x)$
- $f(x) = \cot x \implies f'(x) = -1 - \cot^2 x = -\dfrac{1}{\sin^2 x}$
- $f(x) = \cot f(x) \implies f'(x) = (-1 - \cot^2 f(x)) \cdot f'(x) = -\dfrac{1}{\sin^2 f(x)} \cdot f'(x)$
- $f(x) = \sec x = \dfrac{1}{\cos x} \implies f'(x) = \ldots$
- $f(x) = \operatorname{cosec} x = \dfrac{1}{\sin x} \implies f'(x) = \ldots$

20. $f(x) = \sin^3(-x)$

21. $f(x) = \cos \sqrt[3]{x}$

22. $f(x) = 3^{\operatorname{tg}^2 x}$

23. $f(x) = \log \cos^3 x^2$

24. $f(x) = x^{\cos x}$

- $f(x) = \arcsin x \implies f'(x) = \dfrac{1}{\sqrt{1-x^2}}$
- $f(x) = \arcsin f_1(x) \implies f'(x) = \dfrac{1}{\sqrt{1-f(x)^2}} \cdot f'(x)$
- $f(x) = \arccos x \implies f'(x) = -\dfrac{1}{\sqrt{1-x^2}}$
- $f(x) = \arccos f_1(x) \implies f'(x) = -\dfrac{1}{\sqrt{1-f(x)^2}} \cdot f'(x)$
- $f(x) = \arctan x \implies f'(x) = \dfrac{1}{1+x^2}$
- $f(x) = \arctan f_1(x) \implies f'(x) = \dfrac{1}{1+f(x)^2} \cdot f'(x)$
- $f(x) = x \implies f'(x) = -\dfrac{1}{1+x^2}$
- $f(x) = f_1(x) \implies f'(x) = -\dfrac{1}{1+f(x)^2} \cdot f'(x)$

25. $f(x) = \arctan \dfrac{5}{x}$

26. $f(x) = \arcsin^2 x^2$

27. $f(x) = \arctan(2\cos x)$

28. $f(x) = \sin x$. Calcula $f^{(32)}(x)$.

29. $f(x) = \cos x$. Calcula $f^{(101)}(x)$.

30. $f(x) = \dfrac{5}{x}$. Calcula $f'(x), f''(x), f'''(x), ..., f^{(n)}(x)$.