



Derivera följande uttryck. OBS! Med log menas \ln !

1. a) $\sin \log(9x)$ b) $\frac{x}{5}$
2. a) $\sin \log\left(\frac{7x}{2}\right)$ b) $\log \cos\left(\frac{4x}{3}\right)$
3. a) $\log\left(\frac{3x^2}{7} - \frac{5x}{2} + 1\right)$ b) $\log \sin(5x)$
4. a) $\log \cos x$ b) $e^{\frac{4x^2}{9} + \frac{9x}{4} + \frac{1}{3}}$
5. a) $\sin\left(\frac{2x}{9} + \frac{1}{5}\right)$ b) $\frac{3x}{4}$
6. a) $e^{e^{\frac{x}{2}}}$ b) $e^{2x^2 + \frac{5x}{3}}$
7. a) $e^{\cos\left(\frac{x}{9}\right)}$ b) $\cos \log\left(\frac{9x}{2}\right)$
8. a) $\cos\left(\frac{9x}{4} + \frac{7}{3}\right)$ b) $\cos \cos\left(\frac{x}{2}\right)$
9. a) $e^{\frac{7x}{5} - \frac{7}{8}}$ b) $e^{e^{\frac{x}{7}}}$
10. a) $e^{\sin\left(\frac{x}{5}\right)}$ b) $\sin \cos(2x)$
11. a) $\left(\frac{9x^2}{8} + \frac{5x}{3} - 8\right) e^x$ b) $e^{\frac{2x}{5}} \sin\left(\frac{x}{2}\right)$
12. a) $e^{\frac{x}{8}} \sin\left(\frac{8x}{9}\right)$ b) $\left(\frac{9x^2}{8} + 2x - \frac{3}{4}\right) \left(4x^2 - \frac{7x}{2} - \frac{3}{2}\right)$
13. a) $e^{\frac{x}{2}} \sin\left(\frac{9x}{5}\right)$ b) $\left(\frac{x}{3} - \frac{8}{7}\right) \sin\left(\frac{4x}{3}\right)$
14. a) $\sin x \log(4x)$ b) $e^{\frac{11x}{2}}$
15. a) $e^{\frac{3x}{7}} \log x$ b) $\left(\frac{2x^2}{3} - \frac{5x}{3} - \frac{8}{9}\right) \log\left(\frac{5x}{9}\right)$
16. a) $\left(\frac{7x^2}{5} - x - \frac{9}{7}\right) \sin\left(\frac{7x}{5}\right)$ b) $(x^2 + x + \frac{6}{5}) \sin\left(\frac{x}{7}\right)$
17. a) $e^{\frac{9x}{7}} \log(3x)$ b) $\left(\frac{3x^2}{7} + 3x + \frac{3}{2}\right) \log\left(\frac{2x}{7}\right)$
18. a) $e^{\frac{7x}{3}}$ b) $\left(\frac{8x}{9} + \frac{1}{2}\right) e^{8x}$
19. a) $(x^2 - 4x + 2) \left(\frac{8x^2}{5} - \frac{x}{2} - \frac{1}{9}\right)$ b) $\left(\frac{5x^2}{2} + \frac{3x}{2} - 1\right) \sin\left(\frac{4x}{3}\right)$
20. a) $e^{\frac{5x}{3}} \sin\left(\frac{4x}{9}\right)$ b) $\sin\left(\frac{x}{3}\right) \sin(2x)$
21. a) $\frac{\log x}{\frac{x}{6} - 5}$ b) $\frac{e^{\frac{3x}{2}}}{\sin\left(\frac{7x}{6}\right)}$

22. a) $\left(\frac{2x}{7} - 2\right) e^{-\frac{x}{2}}$

b) $\frac{\frac{8x^2}{3} - \frac{5x}{3} + \frac{3}{8}}{\log\left(\frac{5x}{3}\right)}$

23. a) $\frac{\frac{7x^2}{6} - 2x - 3}{\log\left(\frac{5x}{3}\right)}$

b) $\frac{\sin\left(\frac{9x}{5}\right)}{x+2}$

24. a) $\frac{e^{\frac{x}{8}}}{\frac{x^2}{2} + \frac{9x}{4} - \frac{5}{7}}$

b) $e^{-\frac{7x}{6}} \sin x$

25. a) $\left(2x^2 - \frac{x}{3} + \frac{1}{2}\right) e^{-\frac{4x}{7}}$

b) $\frac{\frac{x^2}{6} - \frac{2x}{3} - \frac{1}{6}}{\frac{7x^2}{9} + \frac{x}{2} - 1}$

26. a) $\frac{\log\left(\frac{7x}{6}\right)}{\sin\left(\frac{3x}{4}\right)}$

b) $\frac{\log\left(\frac{8x}{7}\right)}{\log\left(\frac{5x}{4}\right)}$

27. a) $\left(\frac{x^2}{6} + \frac{x}{5} - \frac{10}{3}\right) e^{-\frac{x}{7}}$

b) $\frac{\sin\left(\frac{5x}{8}\right)}{\sin\left(\frac{8x}{9}\right)}$

28. a) $\left(\frac{9x}{4} + \frac{1}{2}\right) e^{-\frac{5x}{7}}$

b) $\frac{x}{\frac{8x^2}{5} + 5x - \frac{5}{9}}$

29. a) $\left(\frac{5x}{8} - 5\right) e^{-x}$

b) $\frac{\frac{3x}{8} - \frac{7}{6}}{\sin\left(\frac{7x}{2}\right)}$

30. a) $\frac{e^x}{\frac{x^2}{5} - \frac{9x}{2} - \frac{8}{3}}$

b) $\frac{\frac{3x}{2} + \frac{1}{3}}{\frac{5x^2}{8} + \frac{7x}{3} - \frac{10}{9}}$

31. a) $(x+1) \log(7x)$

b) $\frac{\frac{3x}{8} + 1}{3x^2 + \frac{4x}{7} - 8}$

32. a) $\frac{e^{\frac{8x}{7}}}{\sin(2x)}$

b) $\cos e^{2x}$

33. a) $\left(\frac{7x}{6} - \frac{1}{6}\right) e^{8x}$

b) $e^{\frac{8x}{5}} \sin x$

34. a) $\left(\frac{7x}{3} + 6\right) e^{\frac{4x}{9}}$

b) $\left(x - \frac{7}{5}\right) e^{-\frac{2x}{3}}$

35. a) $\frac{x^2 + \frac{4x}{9} - \frac{1}{3}}{\frac{x}{3} + 1}$

b) $e^{\sin(2x)}$

36. a) $\log \cos\left(\frac{2x}{7}\right)$

b) $\frac{x-1}{\log\left(\frac{7x}{5}\right)}$

37. a) $\left(\frac{3x}{8} + \frac{3}{2}\right) e^{-2x}$

b) $\left(\frac{2x}{3} - \frac{10}{9}\right) e^{-\frac{3x}{2}}$

38. a) $\frac{e^{\frac{x}{2}}}{\frac{4x^2}{7} - x + \frac{1}{5}}$

b) $\sin \log\left(\frac{2x}{5}\right)$

39. a) $e^{\frac{25x}{12}}$

b) $\sin e^{7x}$

40. a) $\frac{\log\left(\frac{7x}{9}\right)}{\sin\left(\frac{4x}{9}\right)}$

b) $e^{\frac{3x}{5}} \sin\left(\frac{3x}{4}\right)$

Facit:

1. a) $\frac{\cos \log(9x)}{x}$ b) $\frac{1}{5}$
2. a) $\frac{\cos \log\left(\frac{7x}{2}\right)}{x}$ b) $-\frac{4 \sin\left(\frac{4x}{3}\right)}{3 \cos\left(\frac{4x}{3}\right)}$
3. a) $\frac{\frac{6x}{7} - \frac{5}{2}}{\frac{3x^2}{7} - \frac{5x}{2} + 1}$ b) $\frac{5 \cos(5x)}{\sin(5x)}$
4. a) $-\frac{\sin x}{\cos x}$ b) $\left(\frac{8x}{9} + \frac{9}{4}\right) e^{\frac{4x^2}{9} + \frac{9x}{4} + \frac{1}{3}}$
5. a) $\frac{2 \cos\left(\frac{2x}{9} + \frac{1}{5}\right)}{9}$ b) $\frac{3}{4}$
6. a) $\frac{e^{\frac{x}{2} + \frac{x}{2}}}{2}$ b) $\left(4x + \frac{5}{3}\right) e^{2x^2 + \frac{5x}{3}}$
7. a) $-\frac{e^{\cos\left(\frac{x}{9}\right)} \sin\left(\frac{x}{9}\right)}{9}$ b) $-\frac{\sin \log\left(\frac{9x}{2}\right)}{x}$
8. a) $-\frac{9 \sin\left(\frac{9x}{4} + \frac{7}{3}\right)}{4}$ b) $\frac{\sin\left(\frac{x}{2}\right) \sin \cos\left(\frac{x}{2}\right)}{2}$
9. a) $\frac{7e^{\frac{7x}{5}} - \frac{7}{5}}{5}$ b) $\frac{e^{e^{\frac{x}{7}} + \frac{x}{7}}}{7}$
10. a) $\frac{\cos\left(\frac{x}{5}\right) e^{\sin\left(\frac{x}{5}\right)}}{5}$ b) $-2 \sin(2x) \cos \cos(2x)$
11. a) $\frac{(27x^2 + 94x - 152)e^x}{24}$ b) $\frac{4e^{\frac{2x}{5}} \sin\left(\frac{x}{2}\right) + 5e^{\frac{2x}{5}} \cos\left(\frac{x}{2}\right)}{10}$
12. a) $\frac{3e^{\frac{x}{6}} \sin\left(\frac{8x}{9}\right) + 16e^{\frac{x}{6}} \cos\left(\frac{8x}{9}\right)}{18}$ b) $\frac{288x^3 + 195x^2 - 374x - 6}{16}$
13. a) $\frac{5e^{\frac{x}{2}} \sin\left(\frac{9x}{5}\right) + 18e^{\frac{x}{2}} \cos\left(\frac{9x}{5}\right)}{10}$ b) $\frac{21 \sin\left(\frac{4x}{3}\right) + (28x - 96) \cos\left(\frac{4x}{3}\right)}{63}$
14. a) $\frac{x \cos x \log(4x) + \sin x}{x}$ b) $\frac{11e^{\frac{11x}{2}}}{2}$
15. a) $\frac{3xe^{\frac{3x}{7}} \log x + 7e^{\frac{3x}{7}}}{7x}$ b) $\frac{(12x^2 - 15x) \log\left(\frac{5x}{9}\right) + 6x^2 - 15x - 8}{9x}$
16. a) $\frac{(70x - 25) \sin\left(\frac{7x}{5}\right) + (49x^2 - 35x - 45) \cos\left(\frac{7x}{5}\right)}{25}$ b) $\frac{(70x + 35) \sin\left(\frac{x}{7}\right) + (5x^2 + 5x + 6) \cos\left(\frac{x}{7}\right)}{35}$
17. a) $\frac{9xe^{\frac{9x}{7}} \log(3x) + 7e^{\frac{9x}{7}}}{7x}$ b) $\frac{(12x^2 + 42x) \log\left(\frac{2x}{7}\right) + 6x^2 + 42x + 21}{14x}$
18. a) $\frac{7e^{\frac{7x}{3}}}{3}$ b) $\frac{(64x + 44)e^{8x}}{9}$
19. a) $\frac{576x^3 - 1863x^2 + 916x - 50}{90}$ b) $\frac{(30x + 9) \sin\left(\frac{4x}{3}\right) + (20x^2 + 12x - 8) \cos\left(\frac{4x}{3}\right)}{6}$
20. a) $\frac{15e^{\frac{5x}{3}} \sin\left(\frac{4x}{9}\right) + 4e^{\frac{5x}{3}} \cos\left(\frac{4x}{9}\right)}{9}$ b) $\frac{\cos\left(\frac{x}{3}\right) \sin(2x) + 6 \sin\left(\frac{x}{3}\right) \cos(2x)}{3}$
21. a) $-\frac{6x \log x - 6x + 180}{x^3 - 60x^2 + 900x}$ b) $\frac{9e^{\frac{3x}{2}} \sin\left(\frac{7x}{6}\right) - 7e^{\frac{3x}{2}} \cos\left(\frac{7x}{6}\right)}{6 \sin^2\left(\frac{7x}{6}\right)}$
22. a) $-\frac{(x-9)e^{-\frac{x}{7}}}{7}$ b) $\frac{(128x^2 - 40x) \log\left(\frac{5x}{3}\right) - 64x^2 + 40x - 9}{24x \log^2\left(\frac{5x}{3}\right)}$

$$23. \text{ a) } \frac{(14x^2 - 12x) \log\left(\frac{5x}{3}\right) - 7x^2 + 12x + 18}{6x \log^2\left(\frac{5x}{3}\right)}$$

$$\text{b) } -\frac{5 \sin\left(\frac{9x}{5}\right) + (-9x - 18) \cos\left(\frac{9x}{5}\right)}{5x^2 + 20x + 20}$$

$$24. \text{ a) } \frac{(98x^2 - 1127x - 3668) e^{\frac{x}{8}}}{392x^4 + 3528x^3 + 6818x^2 - 5040x + 800}$$

$$\text{b) } -\frac{e^{-\frac{7x}{6}} (7 \sin x - 6 \cos x)}{6}$$

$$25. \text{ a) } -\frac{(24x^2 - 88x + 13) e^{-\frac{4x}{7}}}{21}$$

$$\text{b) } \frac{195x^2 - 24x + 243}{196x^4 + 252x^3 - 423x^2 - 324x + 324}$$

$$26. \text{ a) } -\frac{3x \cos\left(\frac{3x}{4}\right) \log\left(\frac{7x}{6}\right) - 4 \sin\left(\frac{3x}{4}\right)}{4x \sin^2\left(\frac{3x}{4}\right)}$$

$$\text{b) } \frac{\log\left(\frac{5x}{4}\right) - \log\left(\frac{8x}{7}\right)}{x \log^2\left(\frac{5x}{4}\right)}$$

$$27. \text{ a) } -\frac{(5x^2 - 64x - 142) e^{-\frac{x}{7}}}{210}$$

$$\text{b) } \frac{45 \cos\left(\frac{5x}{8}\right) \sin\left(\frac{8x}{9}\right) - 64 \sin\left(\frac{5x}{8}\right) \cos\left(\frac{8x}{9}\right)}{72 \sin^2\left(\frac{8x}{9}\right)}$$

$$28. \text{ a) } -\frac{(45x - 53) e^{-\frac{5x}{7}}}{28}$$

$$\text{b) } -\frac{3240x^2 + 1125}{5184x^4 + 32400x^3 + 47025x^2 - 11250x + 625}$$

$$29. \text{ a) } -\frac{(5x - 45) e^{-x}}{8}$$

$$\text{b) } \frac{18 \sin\left(\frac{7x}{2}\right) + (196 - 63x) \cos\left(\frac{7x}{2}\right)}{48 \sin^2\left(\frac{7x}{2}\right)}$$

$$30. \text{ a) } \frac{(180x^2 - 4410x + 1650) e^x}{36x^4 - 1620x^3 + 17265x^2 + 21600x + 6400}$$

$$\text{b) } -\frac{4860x^2 + 2160x + 12672}{2025x^4 + 15120x^3 + 21024x^2 - 26880x + 6400}$$

$$31. \text{ a) } \frac{x \log(7x) + x + 1}{x}$$

$$\text{b) } -\frac{441x^2 + 2352x + 1400}{3528x^4 + 1344x^3 - 18688x^2 - 3584x + 25088}$$

$$32. \text{ a) } \frac{8e^{\frac{8x}{7}} \sin(2x) - 14e^{\frac{8x}{7}} \cos(2x)}{7 \sin^2(2x)}$$

$$\text{b) } -2e^{2x} \sin e^{2x}$$

$$33. \text{ a) } \frac{(56x - 1) e^{8x}}{6}$$

$$\text{b) } \frac{8e^{\frac{8x}{5}} \sin x + 5e^{\frac{8x}{5}} \cos x}{5}$$

$$34. \text{ a) } \frac{(28x + 135) e^{\frac{4x}{9}}}{27}$$

$$\text{b) } -\frac{(10x - 29) e^{-\frac{2x}{3}}}{15}$$

$$35. \text{ a) } \frac{3x^2 + 18x + 5}{x^2 + 6x + 9}$$

$$\text{b) } 2 \cos(2x) e^{\sin(2x)}$$

$$36. \text{ a) } -\frac{2 \sin\left(\frac{2x}{7}\right)}{7 \cos\left(\frac{2x}{7}\right)}$$

$$\text{b) } \frac{x \log\left(\frac{7x}{5}\right) - x + 1}{x \log^2\left(\frac{7x}{5}\right)}$$

$$37. \text{ a) } -\frac{(6x + 21) e^{-2x}}{8}$$

$$\text{b) } -\frac{(3x - 7) e^{-\frac{3x}{2}}}{3}$$

$$38. \text{ a) } \frac{(700x^2 - 4025x + 2695) e^{\frac{x}{2}}}{800x^4 - 2800x^3 + 3010x^2 - 980x + 98}$$

$$\text{b) } \frac{\cos \log\left(\frac{2x}{5}\right)}{x}$$

$$39. \text{ a) } \frac{25e^{\frac{25x}{12}}}{12}$$

$$\text{b) } 7e^{7x} \cos e^{7x}$$

$$40. \text{ a) } -\frac{4x \cos\left(\frac{4x}{9}\right) \log\left(\frac{7x}{9}\right) - 9 \sin\left(\frac{4x}{9}\right)}{9x \sin^2\left(\frac{4x}{9}\right)}$$

$$\text{b) } \frac{12e^{\frac{3x}{5}} \sin\left(\frac{3x}{4}\right) + 15e^{\frac{3x}{5}} \cos\left(\frac{3x}{4}\right)}{20}$$