

S 148

$$a) \frac{-\frac{0,5}{5} - \frac{1}{2yx}}{\frac{xy}{5} + 2 + \frac{5}{xy}} = \frac{\frac{-xy - 5}{10xy}}{\frac{(xy)^2 + 10xy + 5^2}{5xy}} = -\frac{(xy+5)}{10xy} \cdot \frac{5xy}{(xy+5)^2} = \frac{-1}{2 \cdot (xy+5)}$$

$$b) \sqrt{x} \cdot \frac{\sqrt[3]{x^2 \cdot \sqrt{x} \cdot x^5}}{x^2 \cdot \sqrt[6]{x^5 \cdot \sqrt[3]{x^2}}} \cdot \sqrt[9]{x} = \frac{x^{1/2} \cdot x^{2/3} \cdot x^{1/2} \cdot x^{5/6} \cdot x^{1/9}}{x^2 \cdot x^{5/6} \cdot x^{2/3}} = x^{1/2 + 2/3 + 1/2 - 2} = x^{\frac{6+8+1-24}{12}} = x^{-9/12} = x^{-3/4} = \frac{1}{\sqrt[4]{x^3}}$$

$$c) \sqrt[3k]{(z^{k-3})^6} \cdot \frac{\left(\sqrt[3]{\sqrt[k]{z^3}}\right)^{3-2k}}{\sqrt[4k]{z^{4k-12}}} = \left((z^{k-3})^6\right)^{1/3k} \cdot \left(\left((z^3)^{1/k}\right)^{1/3}\right)^{3-2k} \cdot \left((z^{4k-12})^{1/4k}\right)^{-1}$$

$$= z^{\frac{2k-6}{k}} \cdot z^{\frac{3-2k}{k}} \cdot z^{\frac{-k+3}{k}}$$

$$= z^{\frac{(2k-6) + (3-2k) + (-k+3)}{k}} = z^{-k/k} = z^{-1} = \frac{1}{z}$$

$$\begin{aligned}
 d) \quad & \frac{9 \cdot (0,5 x^2 y^{-2} z)^4}{54 \cdot (4 x^{-2} y^3 z^{-2})^{-3}} \cdot \frac{16 \cdot (2 x^2 y^5 z^{-4})^{-2}}{36 (3 x^4 y^3 z^{-4})^{-3}} \\
 & \frac{3^2 \cdot 2^{-4} x^8 y^{-8} z^4 \cdot 2^4 \cdot 2^{-2} x^{-4} y^{-10} z^8}{(2 \cdot 3^3) \cdot 2^{-6} x^6 y^{-9} z^6 \cdot (2^2 \cdot 3^2) \cdot 3^{-3} x^{-12} y^{-9} z^{12}} \\
 & \frac{3^2 \cdot 2^4 \cdot 3^3 \cdot 2^6}{2^4 \cdot 2^2 \cdot 2 \cdot 3^3 \cdot 2^2 \cdot 3^2} \cdot \frac{x^8 z^4 z^8 y^9 x^{12} y^9}{y^8 x^4 y^{10} x^6 z^6 z^{12}} \\
 & 2 \cdot \frac{x^{10} y^0}{z^6} = 2 \cdot x^{10} \cdot z^{-6}
 \end{aligned}$$

S 151

$$1) 3 \cdot \log(x-y) + \log(x+y) - 1/2 \cdot \log(x-y)^4$$

$$\log(x-y)^3 + \log(x+y) - \log(x-y)^2 = \log \frac{(x-y)^3 \cdot (x+y)}{(x-y)^2} = \log(x^2 - y^2)$$

$$2) 2 \ln(2x) - 3 \ln 2 + 4 \cdot \ln \sqrt{x} + 2 \cdot \ln(4/x^2)$$

$$\ln(2x)^2 - \ln 2^3 + \ln(x^{1/2})^4 + \ln(4/x^2)^2$$

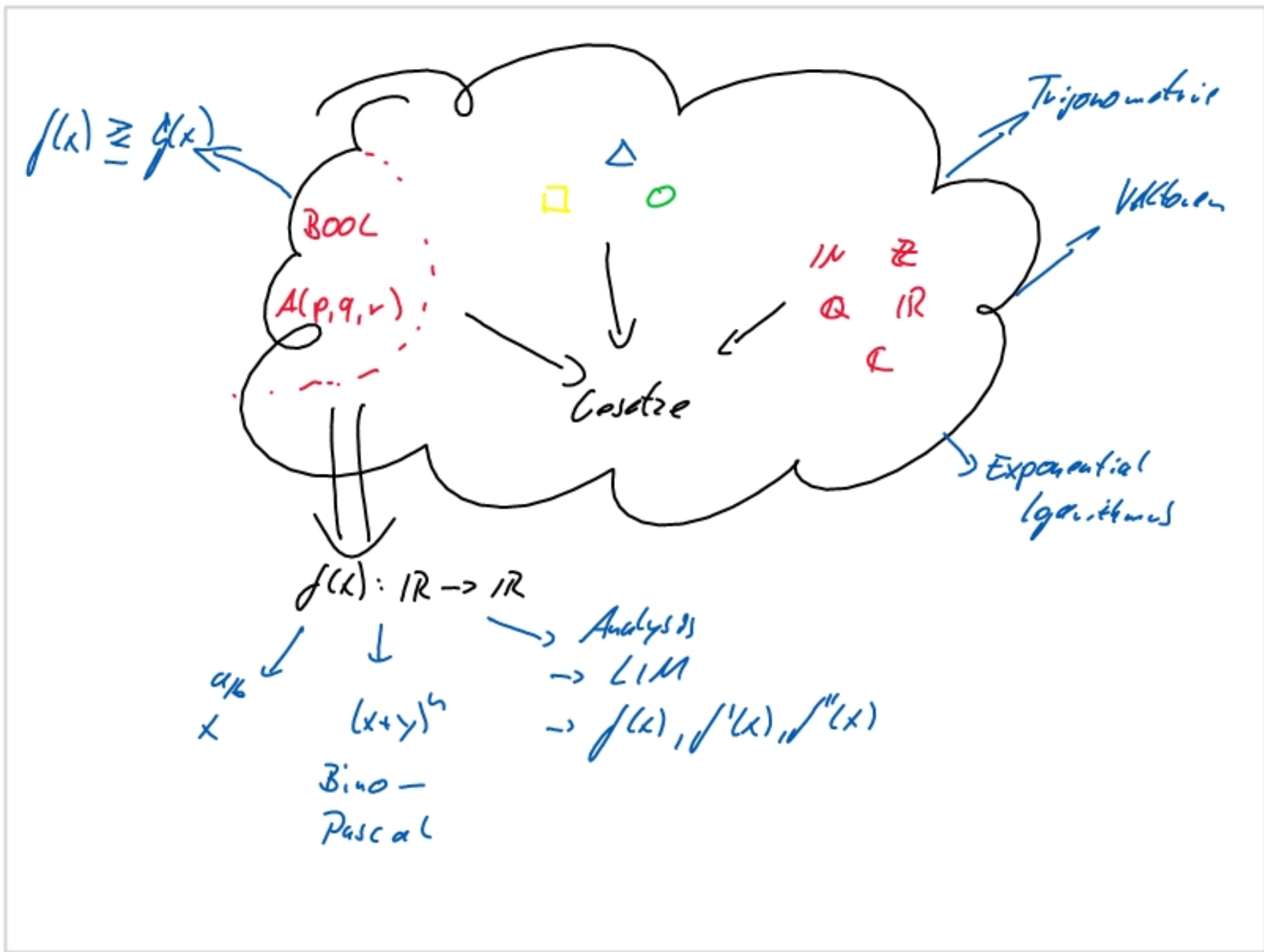
$$\ln \frac{4x^2 \cdot x^2 \cdot 16/x^4}{8} = \ln 8$$

$$3) \log \sqrt[5]{\frac{x^3 y^2}{3 \cdot (x+y)^2}} = \log \frac{x^{3/5} \cdot y^{2/5}}{3^{1/5} \cdot (x+y)^{2/5}} = \log x^{3/5} + \log y^{2/5} - \log 3^{1/5} - \log(x+y)^{2/5}$$

$$= 3/5 \log x + 2/5 \log y - 1/5 \log 3 - 1/5 \log(x+y)^2$$

$$4) \ln \left(\frac{2 \cdot \sqrt{a-25}}{c^2 4 \sqrt{d}} \right)^3 = \ln \left(\frac{2^3 \cdot (a-25)^{3/2}}{c^6 d^{3/4}} \right) = \ln 2^3 + \ln(a-25)^{3/2} - \ln c^6 - \ln d^{3/4}$$

$$= 3 \cdot \ln 2 + 3/2 \cdot \ln(a-25) - 6 \cdot \ln c - 3/4 \ln d$$



$$a^x = b$$

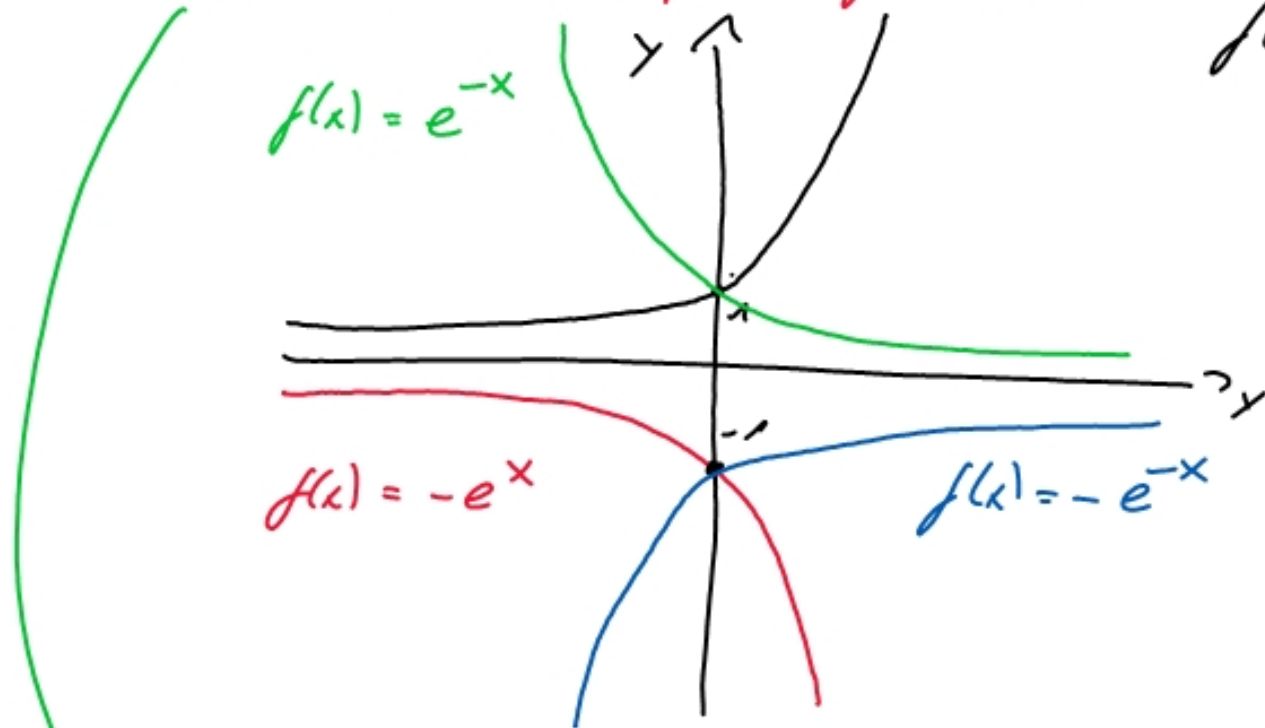
Exponentialfunktion

$$f(x) = e^x$$

$$f(x) = e^{-x}$$

$$f(x) = -e^x$$

$$f(x) = -e^{-x}$$



$$\begin{aligned} a^x &= b & | \text{LOG} \\ x \cdot \log a &= \log b & | : \log a \\ x &= \frac{\log b}{\log a} = \log_a b \end{aligned}$$

$$\begin{aligned} \log_5 150 &= x \\ 5^x &= 150 \\ 5^3 &= 125 \\ 5^4 &= 625 \\ \Rightarrow x &\approx 3,1 \end{aligned}$$