1) $$\frac{\sqrt[n]{x^{n-3}}\cdot\left(\sqrt[n]{x}\right)^{2n+1}}{\sqrt[n]{x^{2n-2}}} = \frac{\left(x^{n-3}\right)^{1/n}\cdot\left(x^{1/n}\right)^{2n+1}}{\left(x^{2n-2}\right)^{1/n}}$$

$$\frac{x^4\cdot x^7}{2x^5} = x^{4+7-5}\cdot\frac{1}{2}$$

$$\frac{x^{\frac{n-3}{n}}\cdot x^{\frac{2n+1}{n}}}{x^{\frac{2n-2}{n}}}$$

$$x^{\frac{n-3}{n}+\frac{2n+1}{n}-\frac{2n-2}{n}}$$

$$= x^{\frac{n}{n}}$$

$$= x$$

2) $$\sqrt[3]{a^2\sqrt{3a\sqrt[4]{a}}}$$

3) $$5\log x + 3\log 4 + \frac{1}{2}\log x^4 = \frac{1}{3}\log x^9 - \log\frac{1}{4}$$

4) $$3\cdot 2^{3x+1}\cdot 5^{-1+3x} = 1{,}2 \text{ MIO} = 1{,}2\cdot 10^6$$

5) $$\ln\left(x+\sqrt{x^2-1}\right)+\ln\left(x-\sqrt{x^2-1}\right)$$

2) $\sqrt[3]{a^2\sqrt{3a\sqrt[4]{a}}} = \left(a^2\left(3a\,(a)^{1/4}\right)^{1/2}\right)^{1/3}$

$\frac{\cancel{4}}{4^3} = \frac{1}{4^2}$

$4\cdot 4\cdot \cancel{4}$

$(a^2)^{1/3}\left((3)^{1/2}\right)^{1/3}\left((a)^{1/2}\right)^{1/3}\left(\left((a)^{1/4}\right)^{1/2}\right)^{1/3}$

$a^{2/3}\cdot 3^{1/6}\cdot a^{1/6}\cdot a^{1/24} = 3^{1/6}\cdot a^{\frac{16+4+1}{24}}$

$x^4 = \frac{1}{2^4} = \left(\frac{1}{2}\right)^4 \quad | \sqrt[4]{\ }$

$3^{1/6}\cdot a^{21/24} = 3^{1/6}\cdot a^{7/8} = \sqrt[6]{3}\cdot\sqrt[8]{a^7}$

3) $5\cdot\log x + 3\log 4 + \frac{1}{2}\log x^4 = \frac{1}{3}\log x^9 - \log\frac{1}{4}$

$\log x^5 + \log 4^3 + \log (x^4)^{1/2} = \log (x^9)^{1/3} - \log\frac{1}{4}$

$\cancel{\log}\frac{x^5\cdot 4^3\quad x^2}{1} = \cancel{\log}\frac{x^3}{1/4}$

$4^3\cdot x^7 = 4\cdot x^3$

$x^4 = 1/4^2 = 1/(2)^4 \qquad x = 1/2$