# Mathematik 1

Potenzen und Wurzeln

Ioannis Christodoulakis

21. November 2020

# Inhaltsverzeichnis


**1 Übung 1: Potenzen** **3**

**2 Übung 2: Wurzeln** **5**

# 1 Übung 1: Potenzen

- $(-1)^{2n-1} = -1$
- $-10^2 = -100$
- $(-10)^{-3} = \frac{1}{(-10)^3} = -\frac{1}{1000}$
- $((-2)^3)^2 = 64$
- $(-1)^{-2n} = \frac{1}{(-1)^{2n}} = 1$
- $-\left(\frac{3}{2}\right)^{-4} = -\left(\frac{2}{3}\right)^{-4} = -\frac{16}{81}$
- $x^7 \cdot x^{-3} \cdot x^{-2} = x^{7-3-2} = x^2$
- $\frac{y^3 \cdot x^{-2}}{(x \cdot y)^2} = \frac{y^3}{x^2 \cdot y^2 \cdot x^2} = \frac{y}{x^4}$
- $\left(\frac{z^{-5}}{z^{-2}}\right)^{-2} = \left(\frac{z^2}{z^5}\right)^{-2} = \left(\frac{z^5}{z^2}\right)^2 = (z^3)^2 = z^6$
- $\left(\frac{3}{5}\right)^4 \div \left(\frac{6}{25}\right)^4 = \left(\frac{3}{5} \cdot \frac{25}{6}\right)^4 = \left(\frac{5}{2}\right)^4 = \frac{625}{16}$
- $a^{n-2} \cdot a^{1-n} = a^{n-2+1-n} = \frac{1}{a}$
- $(a-b)^3 \cdot (b-a)^{-3} = \frac{(a-b)^3}{(-1 \cdot (a-b))^3} = -1$
- $b^{2x-1} \cdot b^{2x+1} \div b^{3x-1} = b^{2x-1+2x+1-3x+1} = b^{x+1} = b \cdot b^x$
- $\left(\frac{a^2}{b^3}\right)^{-2} \cdot \frac{5a^3}{2b^2} \cdot 2ab^{-4} = \left(\frac{b^3}{a^2}\right)^2 \cdot \frac{5a^3}{2b^2} \cdot \frac{2a}{b^4} = 5$
- $\frac{4n^{-2}m^4}{5c^2x^{-3}} \div \frac{8m^3c^{-1}x}{15n^{-2}c} = \frac{4m^4x^3}{5c^2 \cdot n^2} \cdot \frac{15c \cdot c}{n^2 \cdot 8m^3x} = \frac{3mx^2}{2n^4}$
- $\frac{u^2 - t^2}{2u^2 + 4ut + 2t^2} = \frac{(u-t) \cdot (u+t)}{2 \cdot (u+t) \cdot (u+t)} = \frac{u-t}{2 \cdot (u+t)}$

- $(r+r^{-1})^2-(r-r^{-1})^2 = r^2+2+\frac{1}{r^2}-(r^2-2+\frac{1}{r^2}) = 4$

- $(2-p)^3 = 8-12p+6p^2-p^3$

- $\frac{a^{15}-a^{10}}{a^5} = \frac{a^5\cdot(a^{10}-a^5)}{a^5} = a^{10}-a^5$

- $\frac{\frac{a^2-b^2}{ab+b^2}}{\frac{(a-b)^2}{ab^2}} = \frac{(a+b)\cdot(a-b)}{b\cdot(a+b)}\cdot\frac{ab\cdot b}{(a-b)\cdot(a-b)} = \frac{ab}{a-b}$

## 2 Übung 2: Wurzeln

- $\dfrac{\sqrt{27}}{\sqrt{3}} = 3$
- $\sqrt{\dfrac{4}{49}} = \dfrac{2}{7}$
- $\sqrt{\dfrac{b^8}{25c^2}} = \dfrac{b^4}{5c}$
- $\dfrac{\sqrt{a^3b}}{\sqrt{ab^5}} = \dfrac{a}{b^2}$
- $\sqrt{2ac} \cdot \sqrt{\dfrac{8a}{c}} = 4a$
- $\sqrt{\dfrac{9m^3}{5n}} \div \sqrt{\dfrac{81m}{20n^5}} = \dfrac{2}{3}m \cdot n^2$
- $\sqrt[3]{8r^6t^4} = 2r^2 \cdot t^3 \sqrt[3]{t}$
- $\sqrt{a} \cdot \sqrt[3]{a^2} = a \cdot \sqrt[6]{a}$
- $\dfrac{\sqrt{a} \cdot \sqrt[3]{a}}{\sqrt[6]{a}} = \sqrt[3]{a^2}$
- $\dfrac{\sqrt{x}}{x^{\frac{1}{3}}} = \sqrt[6]{x}$
- $\dfrac{y^{\frac{3}{4}} \cdot \sqrt[6]{y}}{y^{\frac{7}{12}}} = \sqrt[3]{y}$
- $(75x)^{\frac{1}{2}} \div (3x)^{\frac{1}{2}} = 5$

Nenner ohne Wurzel:

- $\dfrac{5}{\sqrt{3}+1} = \dfrac{5 \cdot \sqrt{3} - 5}{2}$
- $\dfrac{a-b}{\sqrt{a-b}} = \sqrt{a-b}$

- $\frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}} = \frac{7+2\cdot\sqrt{10}}{3}$

- $1000^{-\frac{1}{3}} = \frac{1}{10}$

- $c^{-\frac{2}{3}} \cdot \sqrt[6]{c} \cdot c^{\frac{1}{2}} = 1$

- $\sqrt[3]{z \cdot \sqrt[4]{\frac{1}{z}}} = \sqrt[4]{z}$

- $(8x^{-9})^{\frac{1}{3}} = \frac{2}{x^3}$

- $\sqrt[3]{x\sqrt{x}} \cdot \frac{x^{\frac{1}{6}}}{\sqrt[3]{x}} = \sqrt[3]{x}$

- $\sqrt[n]{\frac{c^{n+4}}{c^{2n-1}}} = \frac{\sqrt[n]{c^5}}{c}$

- $\sqrt[5]{\sqrt[4]{z^{10}}} = \sqrt{z}$