$$(ab)^m = a^m b^m$$

证明1

$$(ab)^m = \underbrace{abab\cdots ababab}_{m\text{个}ab\text{连乘}}$$

$$= \underbrace{aaaa\cdots aaa}_{m\text{个}a\text{连乘}}\underbrace{bbbb\cdots bbb}_{m\text{个}b\text{连乘}}$$

$$= a^m b^m$$

$$a^m b^m = (ab)^m$$

$$a^m a^n = a^{m+n}$$

证明2

$$a^m a^n = \underbrace{aaaa\cdots aaa}_{m\text{个}a\text{连乘}}\underbrace{aaaa\cdots aaa}_{n\text{个}a\text{连乘}}$$

$$= \underbrace{aaaa\cdots aaa}_{m+n\text{个}a\text{连乘}}$$

$$= a^{m+n}$$

$$\frac{a^m}{a^n} = a^{m-n}$$

证明3

$$\frac{a^m}{a^n} = \underbrace{aaaa\cdots aaa}_{m\text{个}a\text{连乘}} \div \underbrace{aaaa\cdots aaa}_{n\text{个}a\text{连乘}}$$

$$= \underbrace{aaaa\cdots aaa}_{m-n\text{个}a\text{连乘}}$$

$$= a^{m-n}$$

$$\frac{1}{a} = a^{-1}$$

$$x^{\frac{a}{b}} = \sqrt[b]{x^a}$$

$$\left(\frac{1}{a}\right)^m = \frac{1}{a^m}$$

$$\log a^m = m \log a$$

$$\ln(ab) = \ln a + \ln b$$

$$\log_c(ab) = \log_c a + \log_c b$$