Rule 1:

$$a^m \times a^n$$

$$= (a \times a \dots m \text{ times}) \times (a \times a \ n \text{ times})$$

$$= a \times a \times a \dots \times a \ (m+n \text{ times}) \longrightarrow \text{write clearly!}$$

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

$$a^m \times a^n$$

$$= \underbrace{(a \times a \times \dots)}_{\text{'m' times}} \times \underbrace{(a \times a \times \dots)}_{\text{'n' times}}$$

$$= \underbrace{(a \times a \times \dots)}_{(m+n) \text{ times}}$$

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

Rule 2:

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

$$= \frac{a \times a \ldots (m \text{ times})}{a \times a \ldots (n \text{ times})}$$

$$= a \times a \ldots (m-n \text{ times})$$

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

→ Do it clearly!

See class notes

Rule 3:

$(a^m)^n$

$= (a \times a \,(m \text{ times})) \times (a \times a \,(m \text{ times})) \ldots (a \times a \,(m \text{ times}) (n \text{ times})$

$= (a^m) \times a^m) (n \text{ times})$

$= a^{m \times n}$

Rule 4.

a^0

$= \dfrac{a^m}{a^m}$

.

$= a^{m-m}$

$= 1$

$a^0 = a^{m-m}$

$= \dfrac{a^m}{a^m}$

$= 1$ (only if $a \neq 0$)

Rule 5:

$$a^{-n}$$

$$= a^{0-n}$$

$$= \frac{a^0}{a^n}$$

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