

# Proofs Opener

**Directions:** Try and answer each of the following questions about the algebraic expressions listed below:

1. Which statements are true and which are false?
2. How do we show that false statements are false?
3. Which statements must we assume to be true, i.e. accept them as a definition?
4. Which can be derived from what we have assumed?
5. How do we show that true statements are true?
6. In what order should we try to derive them?

**Expressions:**

1.  $(a + b)^{-1} = \frac{1}{a} + \frac{1}{b}$

8.  $a^n = \overbrace{a \times a \times a \times \cdots \times a}^{n\text{-copies of } a}$

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

9.  $(a \times b)^n = a^n \times b^n$

3.  $a^n \times a = a \times a^n = a^{n+1}$

10.  $(a + b)^{1/n} = a^{1/n} + b^{1/n}$

4.  $a^{-n} = \frac{1}{a^n}$

11.  $a^{1/n} = \sqrt[n]{a}$

5.  $\sqrt[n]{a^m} = a^{n/m} = (\sqrt[n]{a})^m$

12.  $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

6.  $a^0 = 1$

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

7.  $(a + b)^n = a^n + b^n$

14.  $a^n \times a^m = a^{n+m}$