

RULES OF EXPONENTS

$$1) x^n \cdot x^m = x^{n+m}$$

$$x^2 \cdot x^3 = x^5$$

$$x \cdot x \cdot x \cdot x \cdot x$$

$$2) \frac{x^n}{x^m} = x^{n-m}$$

$$\frac{x^5}{x^2} = x^3$$

$$\frac{x \cdot x \cdot x \cdot x \cdot x}{x \cdot x} = x^3$$

$$\frac{x^n}{x^m} = \frac{1}{x^{m-n}}$$

$$\frac{x^2}{x^5} = \frac{1}{x^3}$$

$$3) x^0 = 1 \quad \text{why?}$$

$$1 = \frac{x^n}{x^n} = x^{n-n} = x^0$$

$$4) x^{-n} = \frac{1}{x^n} \quad \text{why?}$$

$$\frac{1}{x^n} = \frac{x^0}{x^n} = x^{0-n} = x^{-n}$$

$$5) (x^n)^m = x^{n \cdot m}$$

$$\text{EX: } (x^2)^3 = x^6$$

$$x^2 \cdot x^2 \cdot x^2 = x^6$$

$$6) (x \cdot y)^n = x^n \cdot y^n$$

$$\text{EX: } (x \cdot y)^3 = x^3 y^3$$

$$x \cdot y \cdot x \cdot y \cdot x \cdot y = x^3 y^3$$

$$7) \left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$$

$$\text{EX: } \left(\frac{x}{y}\right)^2 = \frac{x^2}{y^2}$$

WARNING: $(x+y)^n \neq x^n + y^n$
 $(x-y)^n \neq x^n - y^n$

$$8) \sqrt[n]{x^m} = x^{m/n}$$

$$\text{EX: } \sqrt[3]{x^2} = x^{2/3}$$

$$\text{EX: } \sqrt[3]{x} = x^{1/3}$$

$$\text{EX: } \sqrt{x} = x^{1/2}$$

$$\text{EX: } \frac{1}{\sqrt{x}} = \frac{1}{x^{1/2}} = x^{-1/2}$$