## Logarithmic Functions

Example:

$$\times$$
 = 2

To solve an equation with addition, we need Sustraction

$$\times = 999 - 123$$

$$(*)$$
 Solve:  $4x = 7$ 

To solve equators with multiplication, we need division.

Solve: 
$$4^{\times} = 15$$

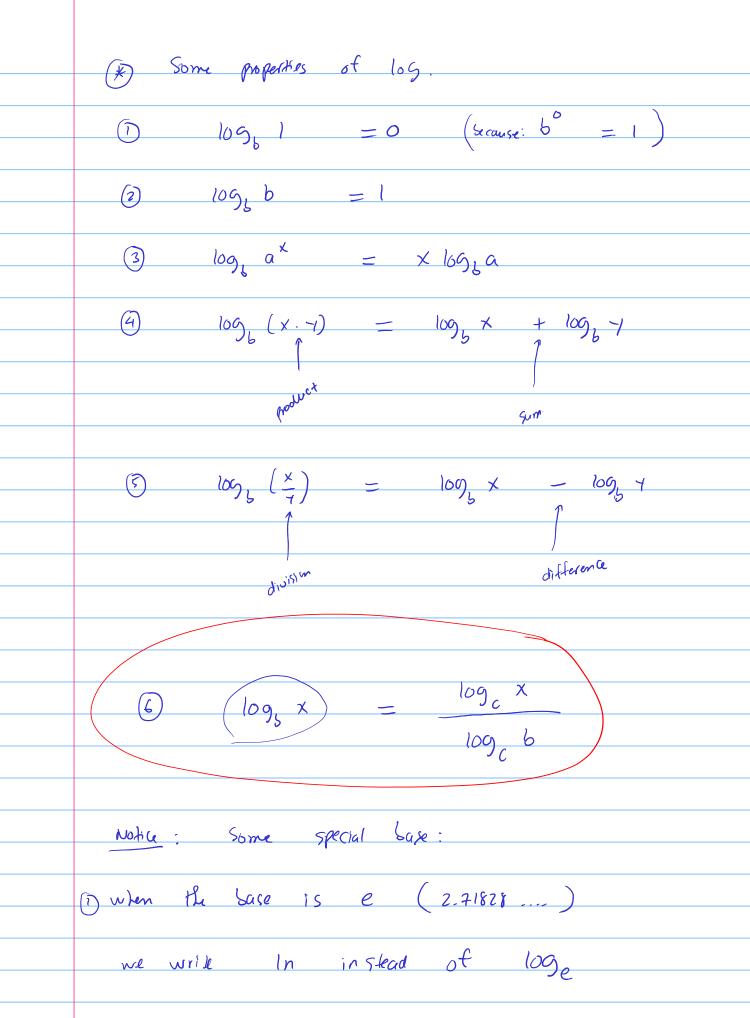
$$\Rightarrow \qquad \times = 109 \quad 15$$

$$\rightarrow$$
  $\times = 109_{2}3$ 

$$=$$
  $\times = 109 2025$ 

## (x) Definition:

If 
$$x = b^{7}$$
 then



$$\log_b a = \frac{\ln a}{\ln b}$$
 ( $\ln a = \log_e a$ )

$$\log_b a = \frac{\log a}{\log b} \left( \log a - \log_{10} a \right)$$

## Example: Solve:

(2) 
$$9^{\times} = 20 = 20 \times 100 \times 100$$

$$(3x+1)$$
 $(2x+1)$ 
 $(3x+1)$ 

$$=$$
  $3x + 1 = ln 10$ 

$$= 3x = 1n10 - 1$$

$$\frac{1}{3}$$
  $\times = \frac{\ln 10 - 1}{3} \approx .434...$ 

$$\Rightarrow$$
  $6 \cdot 3^{\times} = 19$ 

$$= \frac{3^{X}}{6}$$

$$= 100 (19/6) \approx 1.049$$

(b) 
$$3 \cdot e = 5$$

$$e = 5/3$$

$$=$$
 4x + 7 =  $ln(513)$ 

$$=$$
  $4x = ln(5/3) - 7$ 

## Assignment 8 Solve for x

(1) 
$$2^{x} = 9$$
 (5)  $e^{x} = 70$ 

(2) 
$$3^{x} = 4$$

(2) 
$$3^{x} = 4$$
 (5)  $e^{4x-6} = 2$ 

$$\boxed{3} \quad 2025^{\times} = 2029 \qquad \boxed{7} \quad 6.9 = 7$$

$$(4) \quad 10^{10} = e \quad (8) \quad 7 \cdot e = 8$$

