Evaluate each of these:

1. 
$$\log_{5}125 = 3$$
  
 $5' = 125$ 

4. 
$$\log 0.01 = - 2$$

5. 
$$\log_{27}3 = \frac{1}{3}$$

4. 
$$\log 0.01 = -2$$
 $\log \frac{7}{100} = -01 = \frac{1}{100}$ 

Solve for x.

$$4^{x} = 20$$
  $\longrightarrow$  Log<sub>4</sub>20 = x  $\longrightarrow$  You could use a calculator if the base were 10.

## **Property**

## **Change of Base Formula**

For any positive numbers, M, b, and c, with  $b \neq 1$  and  $c \neq 1$ 

$$\log_b M = \frac{\log_c M}{\log_c b}$$

Hwk #10 Sec 8-3

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Problems 7, 8, 15, 16, 18, 22, 57, 58

**Due Monday** 

$$Log_420 = x$$

$$\log_{b} M = \frac{\log_{c} M}{\log_{c} b}$$

$$b = 4$$
  $M = 20$ 

$$x = \frac{\text{Log}_{10} \ 20}{\text{Log}_{10} 4} = \frac{\text{Log } 20}{\text{Log } 4}$$

## Use the change of base property to find the value of each.

1. Log<sub>5</sub> 500



log500 log5 2. Log<sub>3</sub>15

2.46

log15 log3

4.  $10^{2x+7} = 135$ 

$$X = -2.43$$

5.  $2 \cdot 10^{x-1} + 3 = 50$ 

$$\frac{2 \cdot 10^{X-1} = 47}{2}$$

$$10^{X-1} = 23.5$$

$$\log 23.5 = X-1$$

Solve each.

1. 
$$6^{x} = 100$$

2. 
$$25^{\times} = 68$$

3. 
$$10^{x} = 1123$$
 $|09||23 = \sqrt{3.05}$ 

6.  $4^{2x+1} - 10 = 50$ 

109 60 = 2x+1

7. 
$$\log_6(x+5) = 2$$

$$6^2 = x+5$$

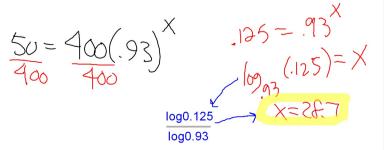
8. 
$$\log_{x}(x + 20) = 2$$

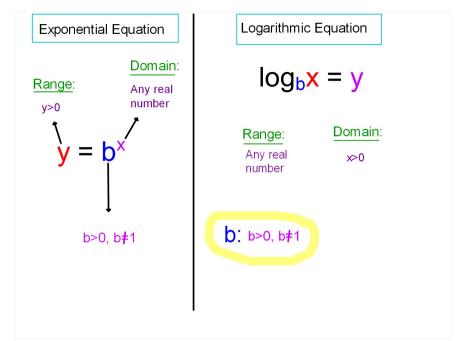
$$\chi^{2} = \chi + 20$$
  $|_{095}(35) = 2$   
 $\chi^{2} - \chi - 20 = 0$   
 $(\chi + 4)(x - 5) = 0$ 

3. The amount of a certain substance decays 7% each year. There was 400 kg of this substance in 2008.

the base can't be negative (see next page)

- a) Find the amount of this substance in 2000 to the nearest tenth.
- b) Find the amount of this substance in 2020 to the nearest tenth.
- c) In how many years after 2008 will there be 50 kg remaining? Round to the nearest tenth.





The population of a city has been increasing 6.7% each year. The population in 1998 was 12,500.

In how many years will the population first exceed 250,000? Round to the nearest hundredth.

250,000 = 12,500(1.067)<sup>x</sup>

$$20 = |.067|^{x}$$

$$(20) = |.067|^{x}$$

$$(30) = |.067|^{x}$$

$$\frac{\log_{10}}{\log_{1.067}}$$