LOGARITHMS!

Do now:

Describe and sketch $y=3^{2-x}$

HW questions?

recall...

$$a^{\frac{1}{n}} = \sqrt[n]{a}$$

so:

$\log_{125} 5 =$

$\log_{25} 5 =$

$\log_{5} 5 =$

NEW NOTATION ALERT!

"common logarithm"

log x actually means $\log_{10} x$

You have a "log" button on your calculator...

so using that, calculate:

log 10
log 100
log 0.1
log 29

Let's look at some large and small numbers:

log 1460359

log 0.0000159

logarithms make

LARGE & small

numbers manageable

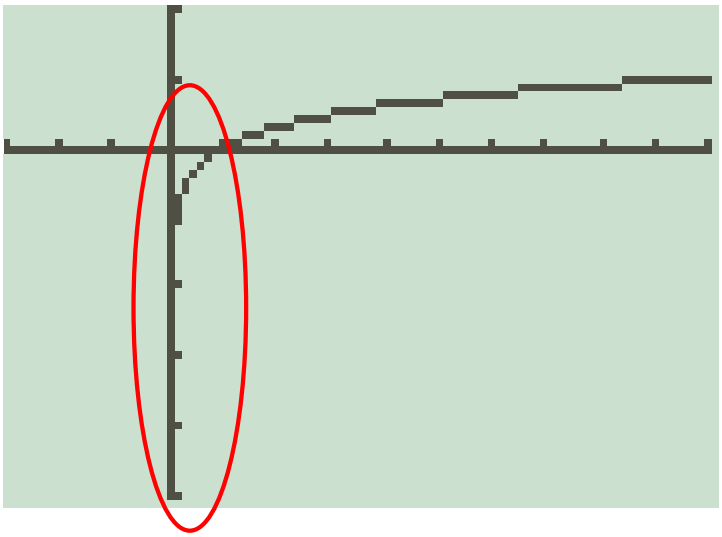
Calculate:

log (-3)

WHY IS IT AN ERROR?!

Use your graphing calculators to find the domain and range of:

$y=\log x$



what happens to y=log x as x gets closer and closer to 0?

why?

NEW NOTATION ALERT!

"natural logarithm"

Besides base 10, another commonly used logarithm is in base e.

ln x actually means $\log_e x$

On your own, calculate:

ln 5924325

ln 0.000235

ln (-3)

ln e

ln 1

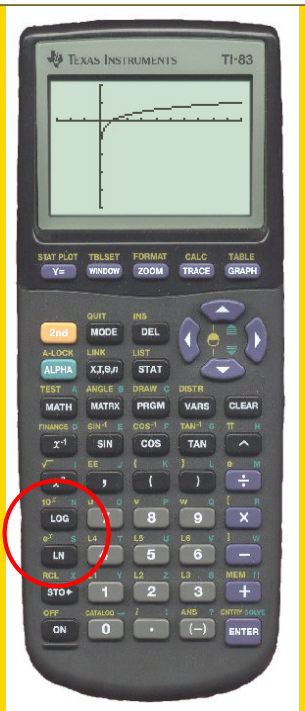
what are some annoying things?

where is our

$\log_2$ button?

$\log_3$ button?

$\log_a$ button?



TOP SECRET CHANGE OF BASE FORMULA:
(we'll learn the reason why this works soon)

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

Evaluate $\log_5 8$ on your calculator using common logarithms...

Evaluate $\log_5 8$ on your calculator using natural logarithms...

Check yo'self!

Find:

(a) $\log_3 10$

(b) $\log_2 22$

(c) $\log_{10} 15$

using your calculator

Check yo'self!

Solve for x:

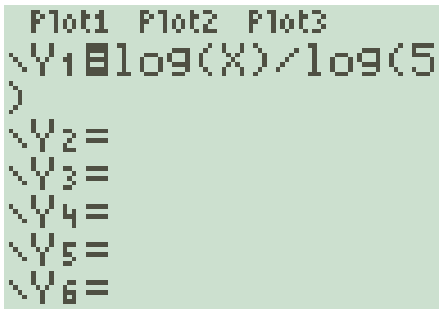
$22=2^x$

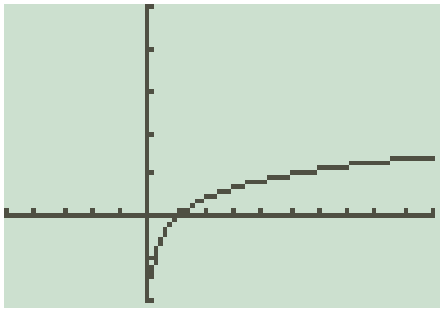
$14=3^x$

$10=5^x$

If I wanted to graph:
$y=\log_5 x$ on the calculator,
how would I do it?

We don't have a $\log_5$
button!





Application Problem!

In a study by psychologists, it was found that the average walking speed w, in feet/sec, of a person living in a city of population P (in thousands) is given by:

$$w(P)=0.37 \ln P + 0.05$$

Before doing any work:

1. do you predict that cities with higher populations will have higher or lower walking speeds?

2. what other factors might come to play in affecting walking speed, besides population?

$$w(P) = 0.37 \ln P + 0.05$$

1. The population of Philadelphia is 1,517,600. Find the average walking speed of people in Philadelphia.

$w(P)=0.37 \ln P + 0.05$

2. The population of Salem, Oregon is 137,000. Find the average walking speed of people in Salem.

$w(P)=0.37 \ln P + 0.05$

3. Graph the function! [what might an appropriate window be?]

$$w(P) = 0.37 \ln P + 0.05$$

4. A sociologist computes the average walking speed of a city to be appoximately 2.0 ft/sec. Use this information to estimate the population of the city.

HW:

Be sure to read examples 12 and 13 carefully.

Section 4.3
#69-78, 79, 81, 83-89 (odd), 91-93, 96.

and you thought sanjaya was annoying...