BE - Alg. 2 | Monday 4-16-12

(1.) Given $f(x) = \frac{x+6}{2}$

$g(x) = 2x - 6$

(A.) Find $(f \circ g)(x)$ or $f[g(x)]$

(B) Find $(g \circ f)(x)$ or $g[f(x)]$

(C) Does $g(x) = f^{-1}(x)$?

Ref. Ex 2 Pg 391 in Ch. 7-8 "Inverse Functions and Relations"

ANS

(A) $f[g(x)] \Rightarrow f(x) = \frac{x+6}{2}$

$$f(2x-6) = \frac{(2x-6)+6}{2}$$

$$= \frac{2x}{2} = \boxed{x} \checkmark$$

(B) $g[f(x)] \Rightarrow g(x) = 2x - 6$

$$g\left(\frac{x+6}{2}\right) = 2\left(\frac{x+6}{2}\right) - 6$$

$$= x+6-6 = \boxed{x} \checkmark$$

(C) Yes, $g(x)$ is the inverse function of $f(x)$. And $f(x)$ is the inverse of $g(x)$. $f(x)$ is a one-to-one function.

How do you find the inverse of a function?

If $f(x) = \frac{x+6}{2}$ how could you find its inverse?

Swap the x & y's

$$y = f(x) = \frac{x+6}{2}$$

$$\therefore f^{-1}(x) \Rightarrow x = \frac{y+6}{2}$$

$$2x = y + 6$$

$$\boxed{y = 2x - 6}$$ ✓

Does an exponential function, like $y = 2^x$ have an inverse?

If $y = f(x) = 2^x$ then $f^{-1}(x)$

$$\Rightarrow x = 2^y$$

How do you get y "by itself" ?

Define y as follows:

y is the exponent of the base 2 which equals x.

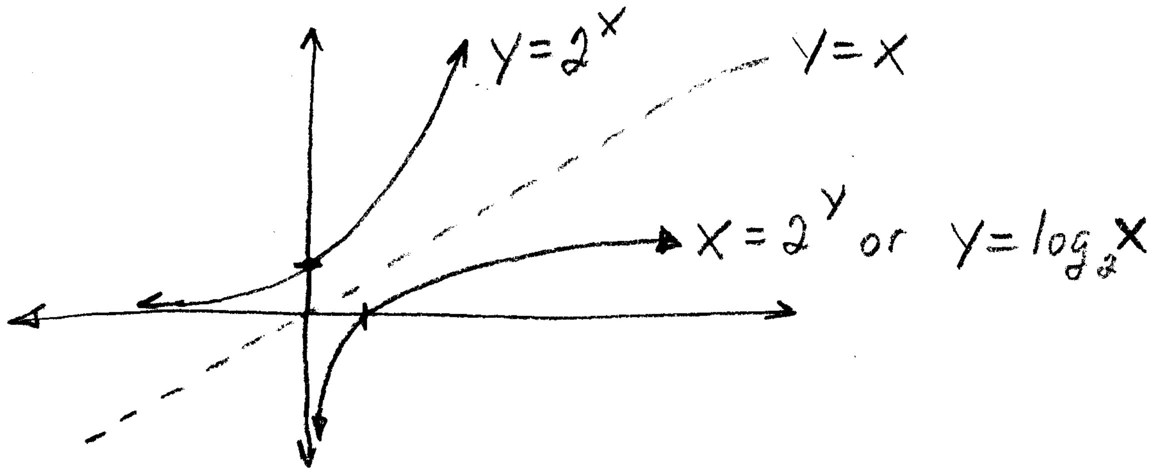
or

y is the logarithm of the base 2 which gives you x.

A logarithm is an exponent...

A logarithm is an exponent...

A logarithm is an exponent...



$y=\log_2 x$ read y = the log to the base 2 of x

or y is THE exponent of base 2 that equals x.

A logarithm is an exponent...
(did I mention this?)

General: $y=\log_b x$ means $b^y = x$

Read: y = the log to the base b of x.

Ch. 10-2 Logarithms and Logarithmic Functions

In general, the base will be any positive number (except 1).

Two special bases: 10 ⇒ common logs (log)

e ⇒ natural logs (ln)

~(2.718...)

Everything else ⇒ $\log_b$

↑ must show base.

Logarithms are exponents, exponents must have a base. Once you ID the log (exponent) and base what is left is what the base raised to that exponent equals.

Ex $\log_3 X = 2 \Rightarrow 3^2 = 9 \therefore \log_3 9 = 2$

$\log_5 X = 3 \Rightarrow 5^3 = 125 \therefore \log_3 125 = 3$

$\log_2 16 = X \Rightarrow 2^X = 16 \therefore X = 4$

$\log_2 16 = 4$

Ex1 Pg 532 WRITE IN EXPONENTIAL form

Ⓐ $\log_8 1 = 0$ $\therefore$ $\boxed{8^0 = 1}$

Ⓑ $\log_2 \frac{1}{16} = -4$ $\therefore$ $\boxed{2^{-4} = \frac{1}{16}}$

Better $\log_2\left(\frac{1}{16}\right) = -4$

Ex2 Pg 532 Write in logarithmic form

Ⓐ $10^3 = 1000$

$\boxed{\log_{10}(1000) = 3}$ or $\log 1000 = 3$

NO BASE = "COMMON" log
SHOWN = base 10

Ⓑ $9^{\frac{1}{2}} = 3$

$\boxed{\log_9 3 = \frac{1}{2}}$

A logarithmic equation is an equation with one or more logarithms in it. Use the definition of logarithms to solve them... Remember: A logarithm is an?

Ex 5 Pg 533 Solve $\log_4 N = \frac{5}{2}$

$$4^{\frac{5}{2}} = N$$

$$\sqrt[2]{4^5} = N$$

$$\left(\sqrt[2]{4}\right)^5 = N$$

$$2^5 = N$$

$$\boxed{32 = N}$$

Ck

$\log_4 32 \stackrel{?}{=} \frac{5}{2}$

$4^{\frac{5}{2}} \stackrel{?}{=} 32$ ✓

Homework: • Pg. 535 # 4-13

• Read Ch. 10-2