Homework Quiz

pg 486 #10c

$4^{2x} = 5^{2x-1}$

Solving Logarithmic Equations

8.6

Example 1: Solve.

$\log_5(2x-1) = \log_5 47$

Example 2: Solve $\log_x 6 = -1/2$

Now you try: $\log_x 0.04 = -2$

Example 3: Solve

$\log_3 25x - \log_3 5 = \log_3 20$

Example 4: $\log x + \log x^3 = 20$

Now you try:
$\log x + \log x^2 = 12$

Example 5: Solve $\log_7(x+1) + \log_7(x-5) = 1$

Now you try

$\log_2(x+3)+\log_2(x-3) = 4$

Example 6: Solve $\log_6 x + \log_6 (x-5) = 2$.

$\log_x y$ $y \neq 0$ $y < 0$

$\log_6 (x(x-5)) = 2$

$\log_6 (x^2 - 5x) = 2$

$\log_x y = a$

$x^a = y$

$6^2 = x^2 - 5x$

$0 = x^2 - 5x - 36$

$0 = (x-9)(x+4)$

$x = 9$ or -4

Example 6: Solve $\log_6 x + \log_6(x-5) = 2$. Check for inadmissible roots.

$\log_6 2 + \log_6(-3) = 2$

$\log_6 x(x-5) = 2$

$6^2 = x(x-5)$

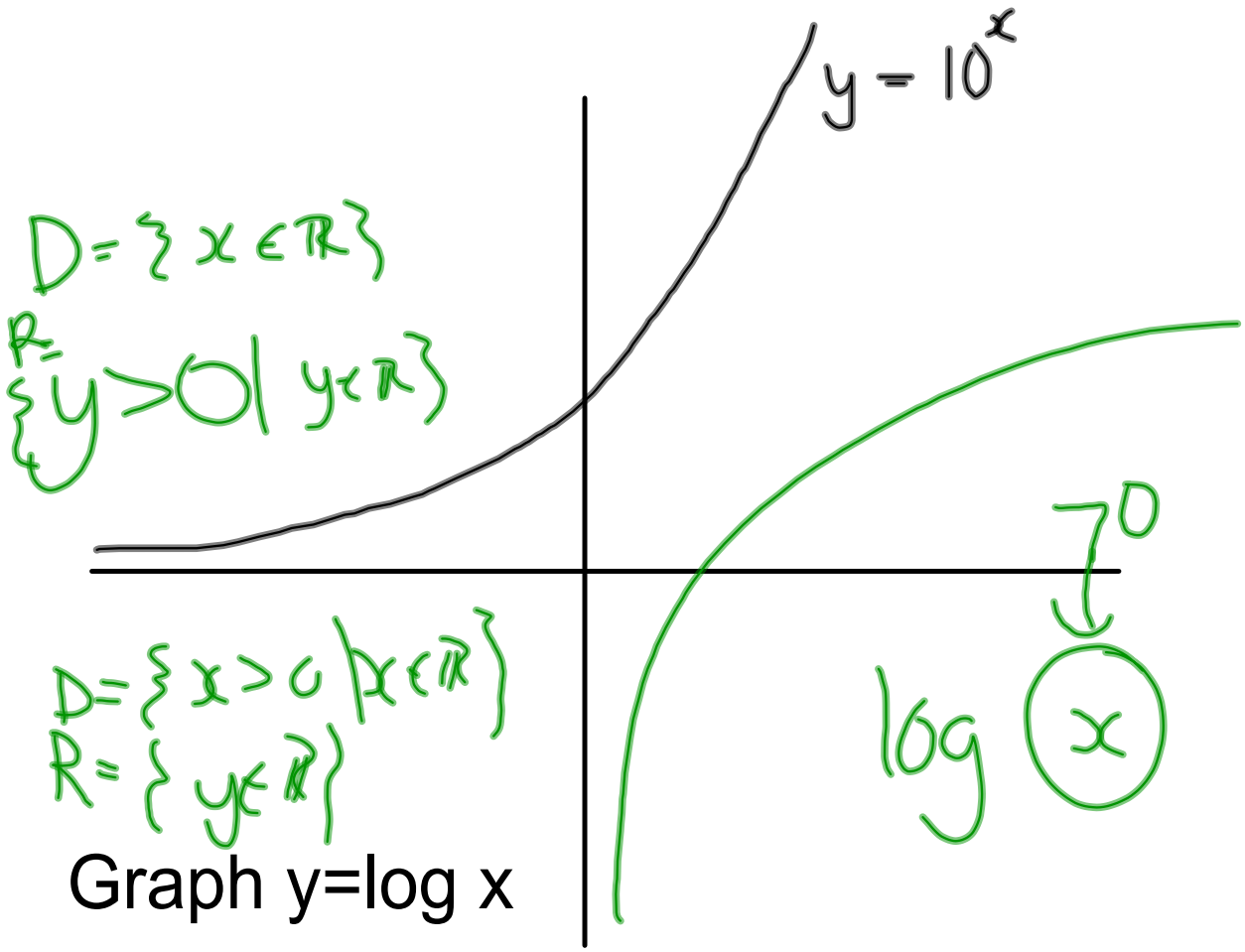
$36 = x^2 - 5x$

$0 = x^2 - 5x - 36$

$0 = (x-9)(x+4)$

$x = 9$ or -4. Which is inadmissible????

$x = 2$ ✗



Graph y=log x

$\log(x+7)$

$x = -5$

$\log_{10} 15$

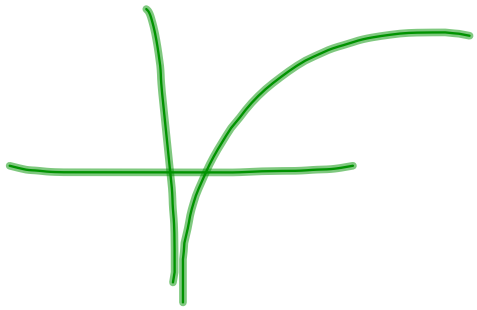
$\log_{10} 10$

$\log_{10} 5$

$\log_{10} 0$

$\log_{10} -5 = x$

log (2x-19)



$\log(2(9.51)-19)$

$\log(0.02)$

Which values of x are not allowed?

$2x-19>0$

$2x>19$

$x>\frac{19}{2}$

$x>9.5$

Example 7: The Richter scale is used to compare the intensities of earthquake The Richter scale magnitude,R, of an earthquake is determined using

R=log(a/T) + B,

where a is the amplitude of the vertical ground motion in microns (μ) , T is the pe of the seismic wave in seconds, and B is a factor that accounts for the weakenin the seismic waves.

An earthquake measures 5.5 on the Richter scale, and the period of the seismic wave was 1.8 s. If B equals 3.2, what was the amplitude, a, of the vertical ground motion?

Solution

R = log (a/T) + B
5.5 = log(a/1.8) +3.2
5.5-3.2=log(a/1.8)
2.3 = log(a/1.8)
$10^{2.3}$ = a/1.8
$1.8 \times 10^{2.3}$ = a

The amplitude was about 359.1 μ.

Example 8:

The loudness, L, of a sound in decibels, (dB) can be calculated using
$L = 10 \log (I/I^0)$,
where I is the intensity of sound in watts per square metre (W/m^2) and $I^0 = 10^{-12}\ W/m^2$.
Determine the intensity of a baby screaming if the noise level is 100dB.

$$100 = 10 \log (I/10^{-12})$$

$$100/10 = \log (I/10^{-12})$$
$$10 = \log (I/10^{-12})$$
$$10^{10} = I/10^{-12}$$
$$10^{10} \times 10^{-12} = I$$
$$10^{-2} = I$$

Now you try : pg 492 #9

$L = 10 \log (I/I^0)$,
where I is the intensity of sound in watts per square metre (W/m^2) and $I^0 = 10^{-12}$ W/m^2.

a) A teacher is speaking to a class. Determine the intensity of the teacher's voice if the sound level is 50dB

$50 = 10 \log(I/I^0)$

$\frac{50}{10} = \log(I/I^0)$

$5 = \log_{10}(I/10^{-12})$

$10^5 = I/10^{-12}$

$10^5 \times 10^{-12} = I$

$10^{-7} = I$

The intensity is 10^{-7} W/m^2

Homework: pg 491-492
#1def
#2def
#3
#4cdef
#5def
#7
#9b
#12
#13
#14
#15
#16

Chapter Review + Practice Test

~~6d~~ 10d

$3^{5x} \cdot 9^{x^2} = 27$

$3^{5x} \cdot (3^2)^{x^2} = 27$

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

$3^{5x+2x^2} = 3^3$