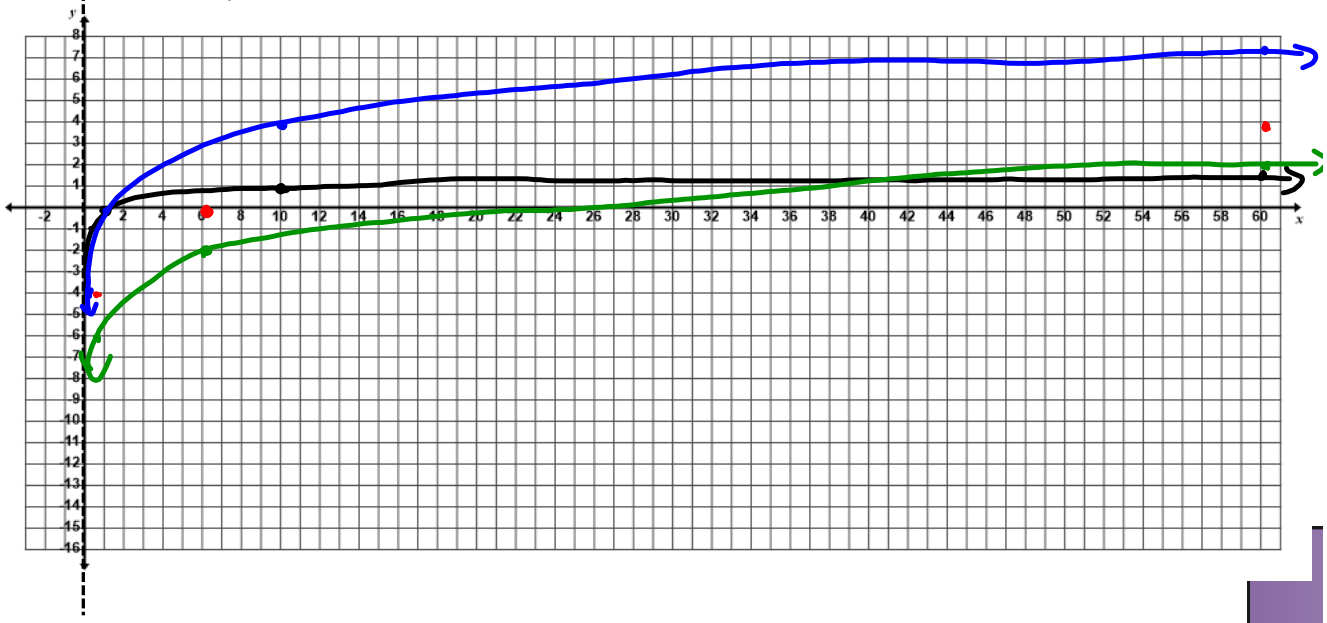
From Hwk: p. 458 # **5.** Sketch the graph of each function using transformations. State the domain and range.

e) $k(x) = 4\log_{10}\left(\frac{1}{6}x\right) - 2$

x	y
$\frac{1}{10}$	-1
1	0
10	1
60	1.77

x = 0

V.S. by a factor of 4
h.s by a factor of 6
v.t. down 2 units



Additional Question: #6. ***Without graphing***,

6. Compare the functions $f(x) = 10^{(\frac{x}{3})} + 1$ and $g(x) = 3\log_{10}(x - 1)$.

y

inverse

$x = 10^{\frac{y}{3}} + 1$

$x - 1 = 10^{\frac{y}{3}}$ → in log form

$\log_{10}(x-1) = \frac{y}{3}$

$3\log_{10}(x-1) = y$

g(x) is the inverse of f(x).

Pull

8.3 Evaluating Logarithms

"I can evaluate any logarithm. I understand that many logarithms in this course can be evaluated without a calculator.
I can apply what I have learned in unfamiliar settings."

Recall: Given the function $y = b^x$ (where $b > 0$) the inverse function is...

$x = b^y$ or $y = \log_b x$

Recall: $\log x = \log_{10} x$

* Calculators are set as base 10.

Ex. 1: Evaluate without using a calculator:

a) $\log_5 125 = y$

$5^y = 125$

$y = 3$

b) $\log 1000000 = y$

$10^y = 1000000$

$y = 6$

c) $\log_4 \left(\frac{1}{64}\right) = y$

$4^y = \frac{1}{64}$ $\quad \therefore 4^{-3}$

$y = -3$ $\quad = \left(\frac{1}{4}\right)^3 \to \frac{1^3}{4^3}$

$= \frac{1}{64}$

d) $\log_5(-25) = y$

$5^y = -25$

Not possible

e) $\log_4 2 = y$

$4^y = 2$

$\therefore y = \frac{1}{2}$

$\because 4^{\frac{1}{2}} = \sqrt{4} = 2$

f) $\log_7 \sqrt[3]{7} = y$

$y = \frac{1}{3}$

$\because 7^y = \sqrt[3]{7}$

$7^{\frac{1}{3}} = \sqrt[3]{7}$

Recall: $\sqrt{x} = x^{\frac{1}{2}}$ $\quad \sqrt[3]{x} = x^{\frac{1}{3}}$ $\quad$ etc.

g) $\log_3 212$ (estimate to nearest tenth)

$3^y = 212$

$y \doteq 4.8$

$3^2 = 9$ $\quad 3^5 = 243$

$3^3 = 27$

$3^4 = 81$

Ex. 2: Simplify:

$\log_b b = y$

$b^y = b$

$y = 1$

$\log_b b = 1$

$\log_b 1 = y$

$b^y = 1$

$y = 0$

$\log_b 1 = 0$

$\log_b b^x = y$

$b^y = b^x$

$y = x$

$\log_b b^x = x$

$b^{\log_b x}$

$= b^y$

$\therefore y = \log_b x$

$= x$ (also from above definition)

$\therefore b^{\log_b x} = x$

Entertainment: pp. 466-468 #1ade, 2ade, 3, 4ad*e, 5ade, 6ade, 8b, 9, 10, 14*, 15 (*it takes 365 d for the Earth to orbit the sun*), 20*, 23

**Note: In #4d the answer should be 1.40.*
For #14 you may round, (and the answer for 14a should be 223 miles per hour.)
In #20b the answer should be -27