Logarithm Word Problems

Genevieve decided to organize a group of volunteers to help at a soup kitchen. Every
or the first three weeks, the number of volunteers tripled so that the number, f(x), aft
veeks is f(x) = 3^x.

. Write the ordered pairs of the function f(x) = 3^x for $0 \le x \le 3$ and locate the pairs
  points on a graph. The domain is the set of non-negative integers.

. Write the ordered pairs for f^{-1}(x) and sketch the graph.

a)

X	Y
0	1
1	3
2	9
3	27

b) f(x) = 3^x

$y = 3^x$

$x = 3^y$

$y = \log_3 x$
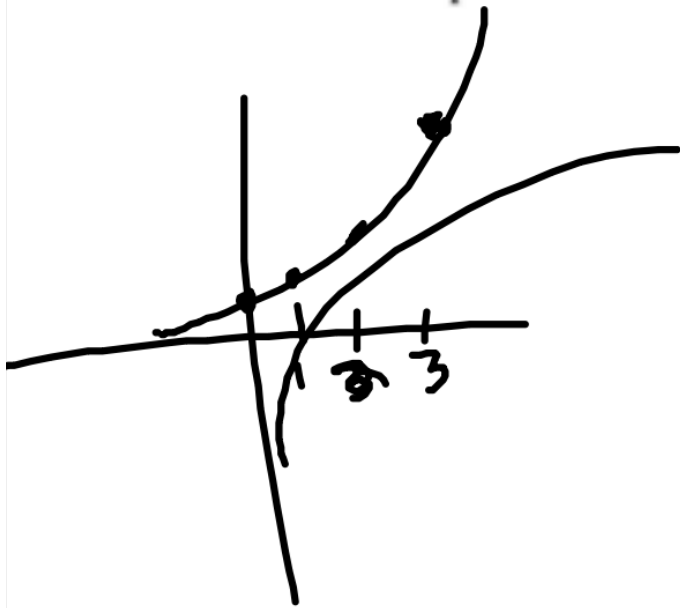
b)

X	Y
0	error und dne
1	0
2	.63
3	1

24. If money is invested at a rate of 5% compounded annually, then for each dollar invested, the amount of money in an account is g(x), when g(x) = 1.05^x after x years.

a. Write the ordered pairs of the function g for $0 \le x \le 3$ and locate the pairs as points on a graph. The domain is the set of non-negative integers.

b. Write the ordered pairs for g^{-1}(x) and sketch the graph. $f(x)$

$f^{-1}(x)$

b) $g(x) = 1.05^x$

$y = 1.05^x$

$x = 1.05^y$

$y = \log_{1.05} x$

a)

x	y
0	1.05
1	1.1025
2	1.157625
3	1.21550625

b)

x	y
0	Error
1	0
2	14.2
3	22.5

75. When $1 is invested at 6% interest, its value, A, after t years is $A = 1.06^t$. Express t in terms of A.

$$A = 1.06^t$$

$$\ln A = \ln 1.06^t$$

$$\frac{\ln A}{\ln 1.06} = \frac{t \cdot \ln 1.06}{\ln 1.06}$$

$$\frac{\ln A}{\ln 1.06} = t$$

$$\frac{\ln 50}{\ln 1.06} = t$$

$$A = 50$$

$$67.13 = t$$

76. R is the ratio of the population of a town n years from now to the population now. If the population has been decreasing by 3% each year, $R = 0.97^n$. Express n in terms of R.

$$R = 0.97^n$$

$$\ln R = \ln 0.97^n$$

$$\frac{\ln R}{\ln 0.97} = \frac{n \cdot \ln 0.97}{\ln 0.97}$$

$$\frac{\ln \frac{2}{3}}{\ln .97} = n$$

$$R = \frac{2}{3}$$

$$n = 13.31 \text{ year}$$

77. The decay constant of radium is -0.0004 per year. The amount of radium, A, present after t years in a sample that originally contained 1 gram of radium is $A = e^{-0.0004t}$.

  a. Express $-0.0004t$ in terms of A and e.

  b. Solve for t in terms of A.

15. When Rita was five, she had $1 in her piggy bank. The next year she doubled the amount that she had in her piggy bank to $2. She decided that each year she would double the amount in her piggy bank. How old will Rita be when she has at least $1,000 in her piggy bank?