

### 3.2 Logarithmic Functions

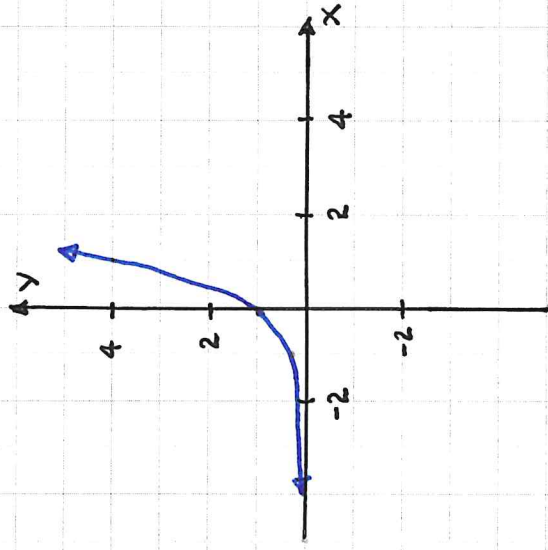
Graph of  $f(x) = 4^x$

x	y
-1	1/4
0	1
1	4

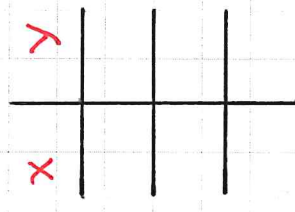
Since  $f(x)$  is a one-to-one function, it has an inverse.

Ex. ① Find a formula for  $f^{-1}(x)$ .

- 1)
- 2)
- 3)
- 4)



Sketch the graph of  $f^{-1}(x)$ .



Graph of  $g(x) = \left(\frac{1}{4}\right)^x$

x	y
-1	4
0	1
1	$\frac{1}{4}$

Since  $g(x)$  is a one-to-one function, it has an inverse.

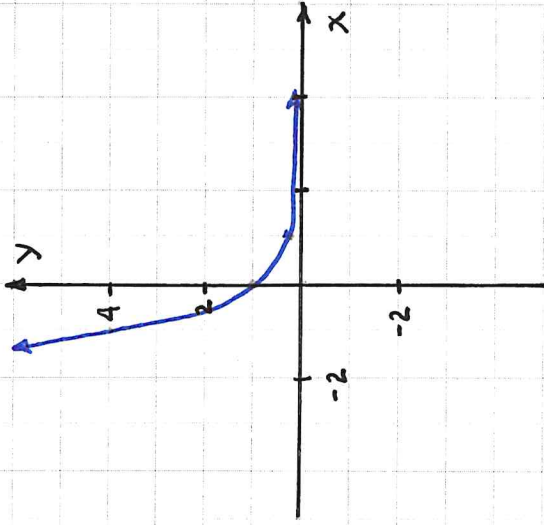
Ex. ② Find a formula for  $g^{-1}(x)$

1)

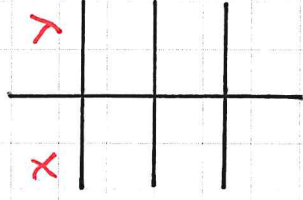
2)

3)

4)



Sketch the graph of  $g^{-1}(x)$ .



## Logarithmic Functions (§3.2)

**\*\*Note:** If  $a > 0$  and  $a \neq 1$  then  $\log_a x = y$  is equivalent to  $x = a^y$ . \*\*

1. Write the following logarithmic equations in exponential form:

a)  $\log_3 243 = 5$

b)  $\log_{36} 6 = \frac{1}{2}$

c)  $-1 = \log_{10} \left( \frac{1}{10} \right)$

d)  $0 = \log_e 1$

2. Write the following exponential equations in logarithmic form:

a)  $9 = 3^2$

b)  $27^{1/3} = 3$

c)  $\frac{1}{100} = 10^{-2}$

d)  $e^{-1} = \frac{1}{e}$

3. Find the exact value of each logarithm without using a calculator.

a)  $\log_5 25$

b)  $\log_{49} 7$

c)  $\log_3 \left( \frac{1}{9} \right)$

d)  $\log_{10} 1000$

4. Use a calculator to evaluate each logarithm.

a)  $\log_{10} 2$

b)  $\log_e \pi$