

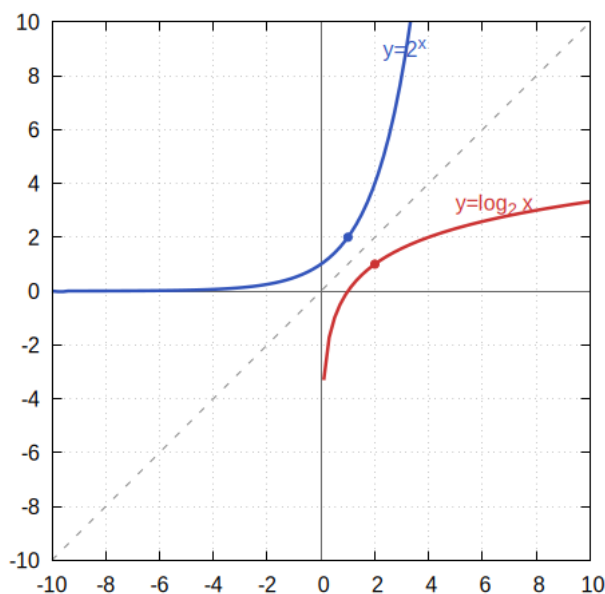
3.1 Introduction to Logarithms and Review of Exponentials Worksheet with solutions

This document was composed and formatted by Annie Bernatchez.

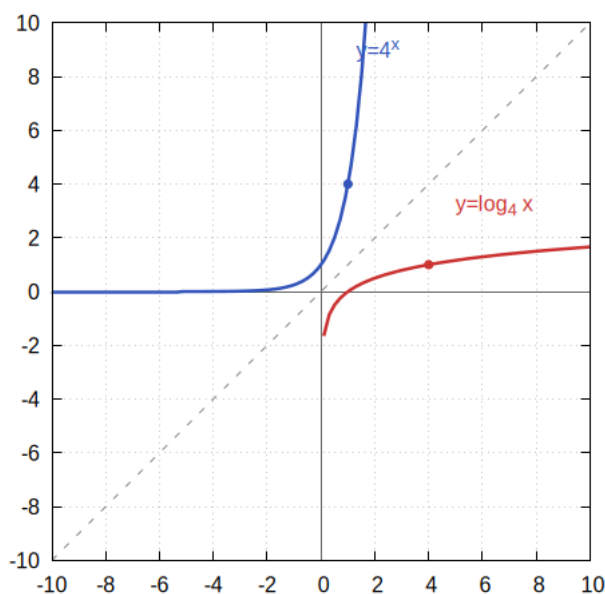
The course material originated from www.jensenmath.ca

1) Sketch a graph of each function. Then, sketch a graph of the inverse of each function. Label each graph with its equation.

a) $y = 2^x$

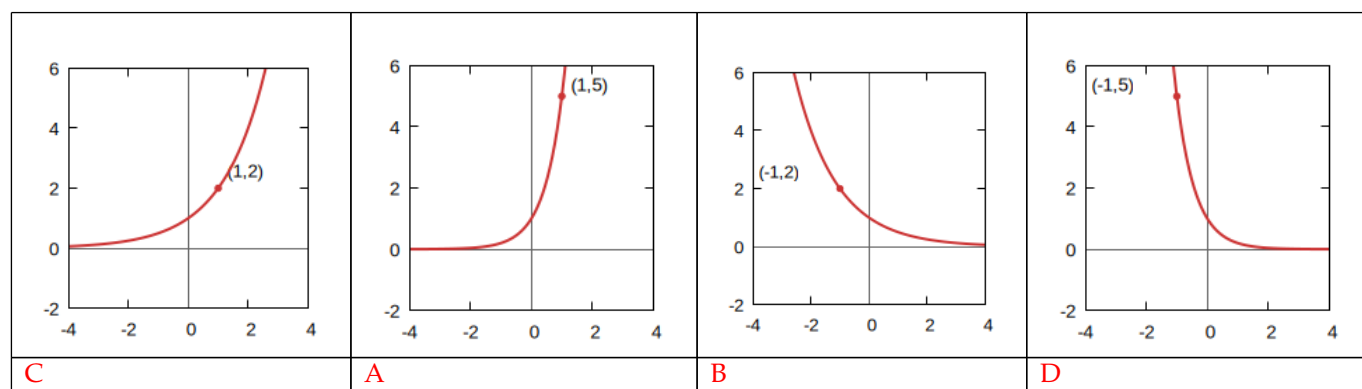


b) $y = 4^x$



2) Match each equation to its corresponding graph.

A) $y = 5^x$ B) $y = \left(\frac{1}{2}\right)^x$ C) $y = 2^x$ D) $y = \left(\frac{1}{5}\right)^x$



3) An influenza virus is spreading according to the function $N = 10(2)^t$, where N is the number of people infected and t is the time, in days.

a) How many people have the virus at each time?

i) initially, when $t = 0$

$$N = 10$$

ii) after 1 day

$$N = 10(2)^1 = 20$$

iii) after 2 days

$$N = 10(2)^2 = 40$$

iv) after 3 days

$$N = 10(2)^3 = 80$$

b) After how many days will 40 960 people be infected?

$$\begin{aligned} 40\,960 &= 10(2)^t \\ 4096 &= 2^t \\ \log 4096 &= \log 2^t \\ \log 4096 &= t \log 2 \\ t &= \frac{\log 4096}{\log 2} \\ t &= 12 \text{ days} \end{aligned}$$

4) Rewrite each equation in logarithmic form

a) $4^3 = 64$

$$\log_4 64 = 3$$

b) $128 = 2^7$

$$\log_2 128 = 7$$

c) $5^{-2} = \frac{1}{25}$

$$\log_5 \left(\frac{1}{25} \right) = -2$$

d) $\left(\frac{1}{2} \right)^2 = 0.25$

$$\log_2 0.25 = -2$$

e) $6^x = y$

$$\log_6 y = x$$

f) $10^5 = 100\,000$

$$\log_{10} 100\,000 = 5$$

g) $\frac{1}{27} = 3^{-3}$

$$\log_3 \left(\frac{1}{27} \right) = -3$$

5) Evaluate each logarithm

a) $\log_2 64$

6

b) $\log_3 27$

3

c) $\log_2 \left(\frac{1}{4} \right)$

-2

d) $\log_4 \left(\frac{1}{64} \right)$

-3

e) $\log_5 125$

3

f) $\log_2 1024$

10

6) Evaluate each common logarithm

a) $\log 1000$

3

b) $\log \left(\frac{1}{10} \right)$

-1

c) $\log 1$

0

d) $\log 0.001$

-3

e) $\log 10^{-4}$

-4

f) $\log 1\,000\,000$

6

7) Rewrite in exponential form

a) $\log_7 49 = 2$

$7^2 = 49$

b) $5 = \log_2 32$

$2^5 = 32$

c) $\log 10\,000 = 4$

$10^4 = 10\,000$

d) $w = \log_b z$

$b^w = z$

e) $\log_2 8 = 3$

$2^3 = 8$

f) $-2 = \log \left(\frac{1}{100} \right)$

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