

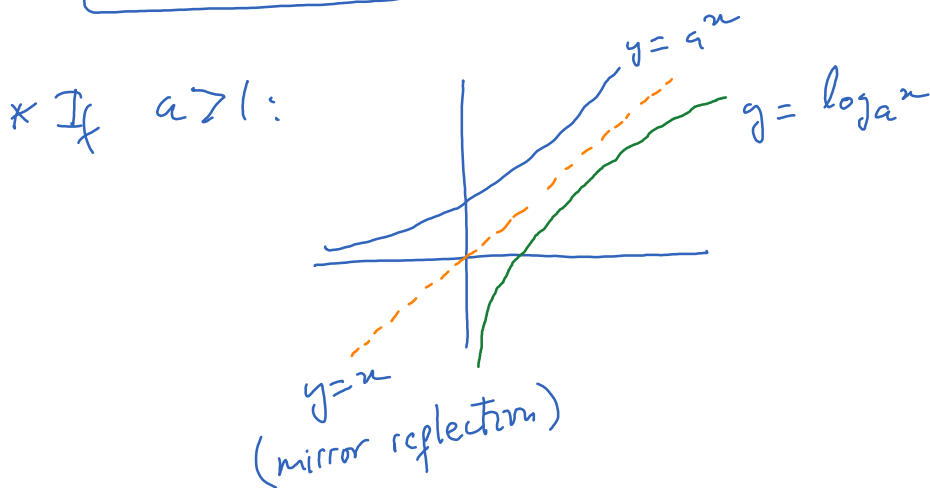
Lecture 3

Thursday, April 6, 2023 11:31 AM

* Questions...

$$a^x \xleftrightarrow{\text{inverse}} \log_a x$$

$$\begin{aligned} a^{\log_a x} &= x \\ \log_a(a^x) &= x \end{aligned}$$



$\log_a x$ is an increasing sequence.

$$\log_a x \rightarrow \infty \quad \text{as } x \rightarrow \infty$$

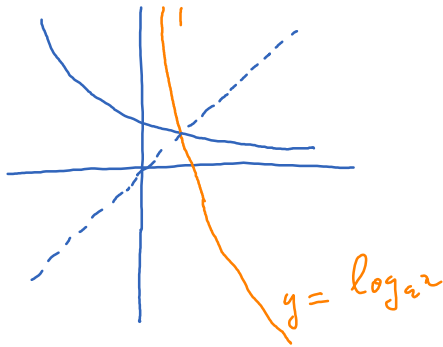
$$\log_a x \rightarrow -\infty \quad \text{as } x \rightarrow 0^+$$

$$\log_a 1 = 0.$$

Domain of $\log_a x$ is $(0, \infty)$.

$\log_a x$ grows very slowly as $x \rightarrow \infty$.

If $0 < a < 1$:



$\log_a x$ is a decreasing function
and
 $\log_a x \rightarrow -\infty$ as $x \rightarrow \infty$
 $\log_a x \rightarrow \infty$ as $x \rightarrow 0^+$.

Ex Evaluate

a) $\log_4 8 = x$

$$4^x = 8 \Rightarrow (2^2)^x = 2^3 \Rightarrow 2^{2x} = 2^3 \Rightarrow 2x = 3$$

$$\Rightarrow x = \frac{3}{2}$$

$$\log_4 8 = \frac{3}{2}$$

b) $\log_{\frac{1}{4}} 32 = x$

$$\left(\frac{1}{4}\right)^x = 32 \Rightarrow (4^{-1})^x = 32 \Rightarrow 4^{-x} = 32$$

$$\Rightarrow (2^2)^{-x} = 2^5$$

$$\Rightarrow 2^{-2x} = 2^5$$

$$\Rightarrow -2x = 5 \Rightarrow x = -\frac{5}{2}$$

$$\log_{\frac{1}{4}} 32 = -\frac{5}{2}$$