Lesson 14

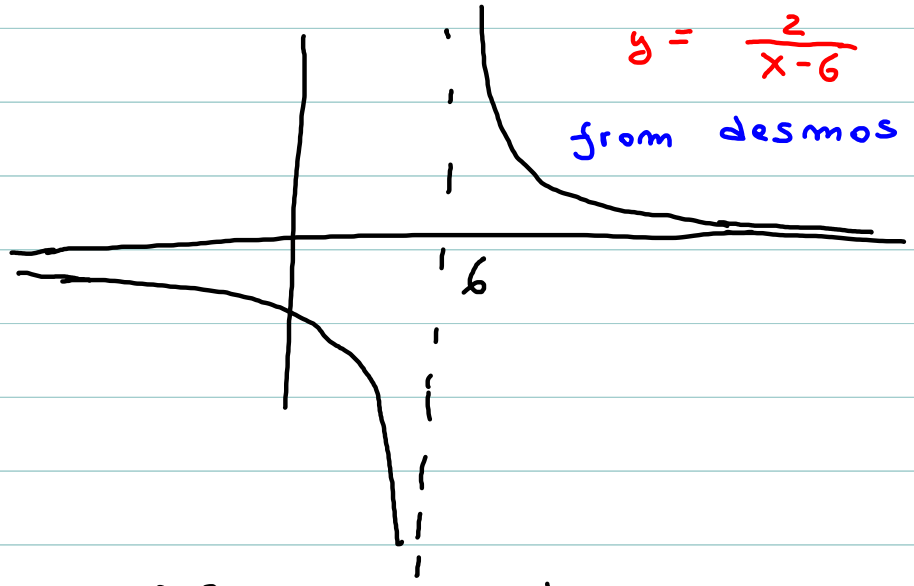
Read Chapter 10

Exponential functions

From last time

$f(x) = \dfrac{2}{x-6}$ DOMAIN $(-\infty, 6) \cup (6, +\infty)$

RANGE $(-\infty, 0) \cup (0, +\infty)$



$y = \dfrac{2}{x-6}$ from desmos

Invertible? yes f^{-1}: Domain $(-\infty, 0) \cup (0, +\infty)$

Range $(-\infty, 6) \cup (6, +\infty)$

Formula: $y = \dfrac{2}{x-6}$

$(x-6) \cdot y = 2$

$(x-6) = \dfrac{2}{y}$

$x = 6 + \dfrac{2}{y}$ $\quad f^{-1}(y) = 6 + \dfrac{2}{y}$

Explain why $f(x) = -2x^2 + 60x$ is not invertible.

What is the inverse of $f(x) = -2x^2 + 60x$ on $[15, +\infty)$

What is the inverse of $f(x) = -2x^2 + 60x$ on $(-\infty, 15]$

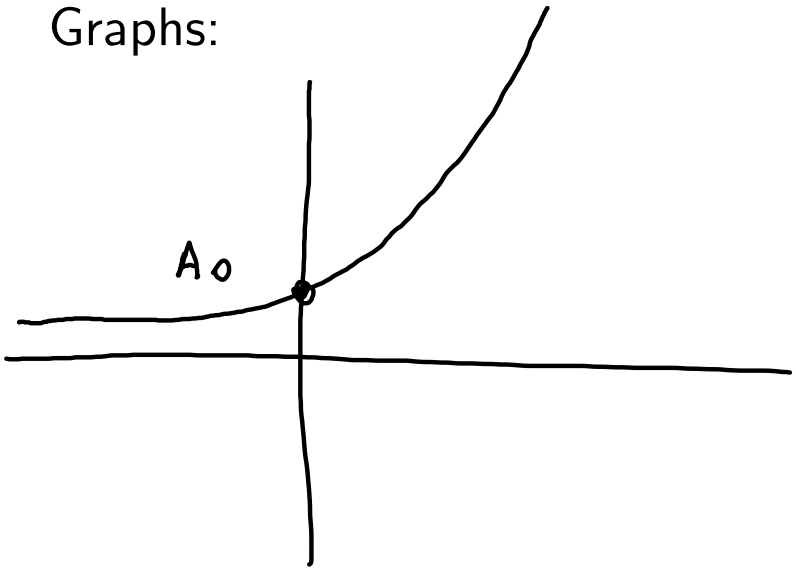
Suppose p is the price of an item and $q = f(p)$ is the number of items sold at that price. Explain in words the meaning of:
$f(25)$

$f^{-1}(30)$

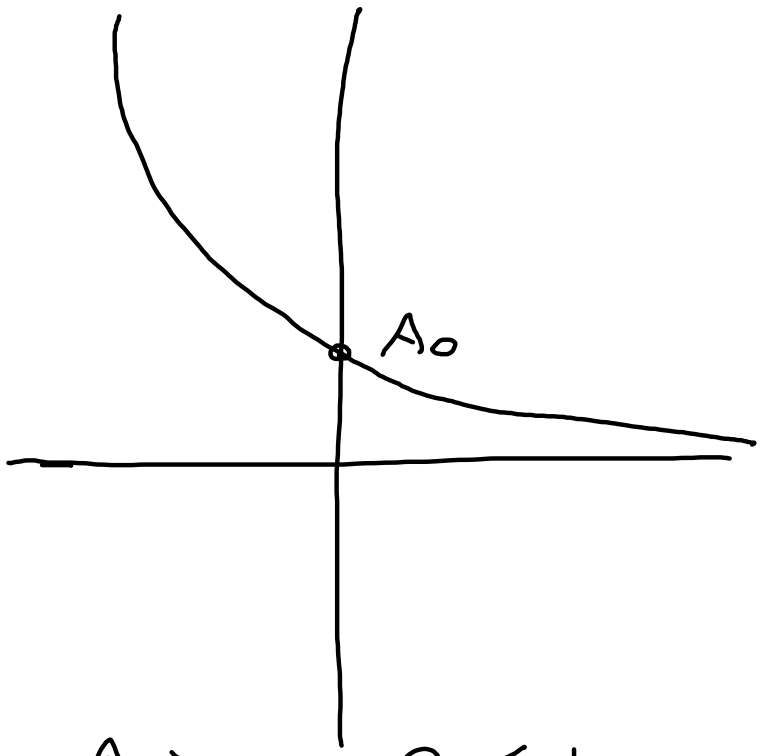
Function in standard exponential form : $f(x) = A_0\, a^x \quad , a > 0$ and $a \neq 1$

$f(0) = A_0$

Graphs:



$A_0 > 0 \quad a > 1$



$A_0 > 0 \quad a < 1$

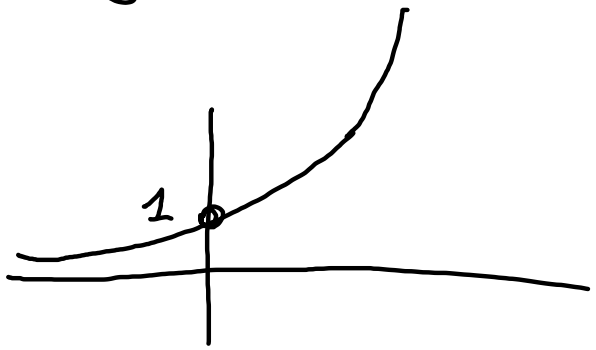
Useful algebra

1. $a^{x+y} = a^x\, a^y$
2. $a^{-x} = \frac{1}{a^x}$
3. $a^{\frac{m}{n}} = \sqrt[n]{a^m}$
4. $a^{xy} = (a^x)^y$

Put $f(x) = 3 \cdot 2^{-x+\frac{1}{2}}$ in standard exponential form

Put $f(x) = \frac{5}{3^{2x-10}}$ in standard exponential form

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



Invertible ?

$\ln x$ is the inverse of e^x . This means

$$\ln e^x = x$$

$$e^{\ln y} = y$$

If $e^x = y$ then $x = \ln y$ and vice-versa