Colegio Santa María de Maipú.

Departamento de Matemática. Relación entre funciones

RETROALIMENTACIÓN Nº10 MATEMÁTICA

IIIº MEDIO

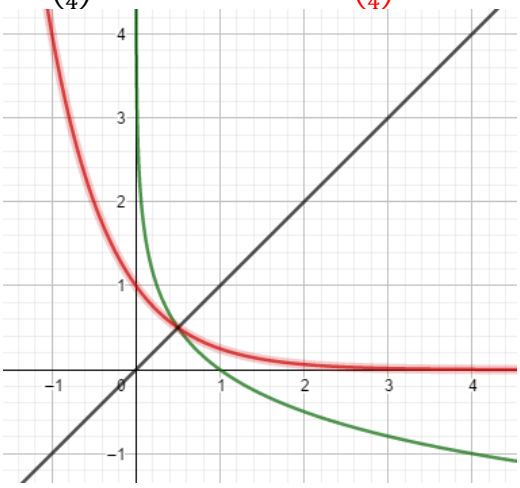
No olvides que frente a cualquier duda o consulta con respecto a tu clase y/o ejercitación debes contactarnos al correo: matematica.iii.smm@gmail.com

1. *Representa en el plano cartesiano la función y su inversa de:*

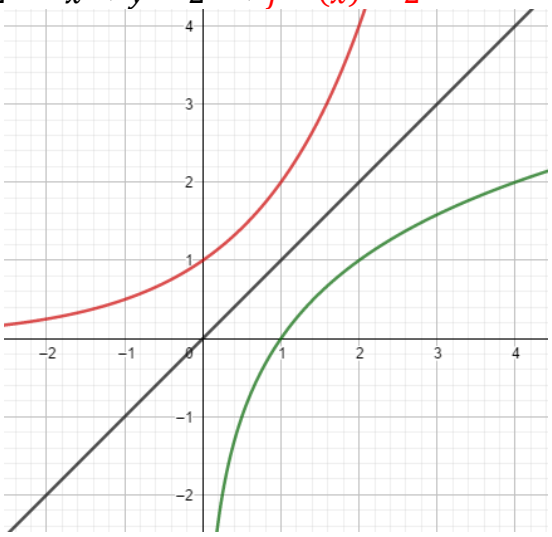
a. $f(x) = \log_{\frac{1}{4}} x \rightarrow y = \log_{\frac{1}{4}} x \rightarrow$

aplicamos definición de logarítmo: $\left(\frac{1}{4}\right)^y = x \rightarrow$

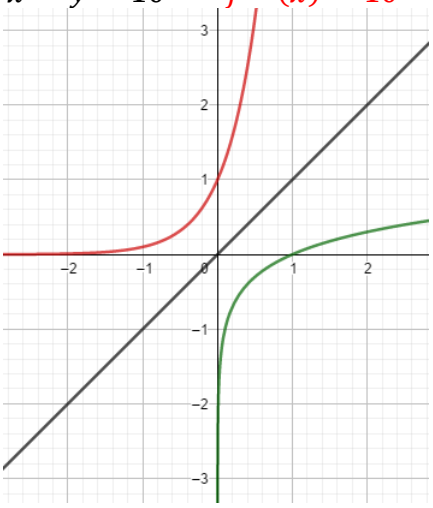
cambiamos las letras: $\left(\frac{1}{4}\right)^x = y \rightarrow f^{-1}(x) = \left(\frac{1}{4}\right)^x$



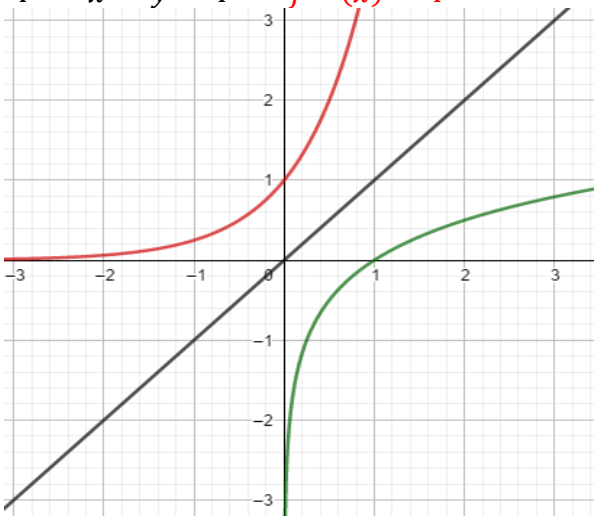
b. $f(x) = \log_2 x \rightarrow 2^y = x \rightarrow y = 2^x \rightarrow f^{-1}(x) = 2^x$



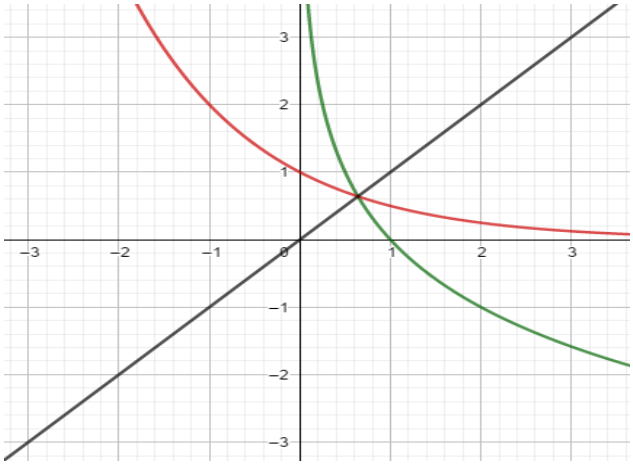
c. $f(x) = \log x \rightarrow 10^y = x \rightarrow y = 10^x \rightarrow f^{-1}(x) = 10^x$



d. $f(x) = \log_4 x \rightarrow 4^y = x \rightarrow y = 4^x \rightarrow f^{-1}(x) = 4^x$



e. $f(x) = \log_{\frac{1}{2}} x \rightarrow \left(\frac{1}{2}\right)^y = x \rightarrow y = \left(\frac{1}{2}\right)^x \rightarrow f^{-1}(x) = \left(\frac{1}{2}\right)^x$



2. Determina algebraicamente la inversa de las siguientes funciones:
   Ejemplo:

   a. $f(x) = 4^x$

$$y = 4^x \quad \therefore \ \log_4$$
$$\log_4 y = \log_4 4^x$$
$$\log_4 y = x$$
$$\log_4 x = y \rightarrow f^{-1}(x) = \log_4 x$$

   b. $g(x) = (\frac{1}{2})^x$

$$y = \left(\frac{1}{2}\right)^x \quad \therefore \ \log_{\frac{1}{2}}$$
$$\log_{\frac{1}{2}} y = \log_{\frac{1}{2}} \left(\frac{1}{2}\right)^x$$
$$\log_{\frac{1}{2}} y = x$$
$$\log_{\frac{1}{2}} x = y \rightarrow f^{-1}(x) = \log_{\frac{1}{2}} x$$

   c. $f(x) = e^x$

$$y = e^x \quad \therefore \ln$$
$$\ln y = \ln e^x$$
$$\ln y = x$$
$$\ln x = y \rightarrow f^{-1}(x) = \ln x$$

   d. $f(x) = 3^{-x}$

$$y = \left(\frac{1}{3}\right)^x \quad \therefore \ \log_{\frac{1}{3}}$$
$$\log_{\frac{1}{3}} y = \log_{\frac{1}{3}} \left(\frac{1}{3}\right)^x$$
$$\log_{\frac{1}{3}} y = x$$
$$\log_{\frac{1}{3}} x = y \rightarrow f^{-1}(x) = \log_{\frac{1}{3}} x$$

   e. $f(x) = \log_{\frac{1}{5}} x \rightarrow y = \log_{\frac{1}{5}} x \rightarrow \left(\frac{1}{5}\right)^y = x \rightarrow \left(\frac{1}{5}\right)^x = y \rightarrow f^{-1}(x) = \left(\frac{1}{5}\right)^x$

   f. $f(x) = \log_{\frac{3}{4}} x \rightarrow y = \log_{\frac{3}{4}} x \rightarrow \left(\frac{3}{4}\right)^y = x \rightarrow \left(\frac{3}{4}\right)^x = y \rightarrow f^{-1}(x) = \left(\frac{3}{4}\right)^x$

   g. $f(x) = 6^x$

$$y = 6^x \quad \therefore \ \log_6$$
$$\log_6 y = \log_6 6^x$$
$$\log_6 y = x$$
$$\log_6 x = y \rightarrow f^{-1}(x) = \log_6 x$$

h. $f(x) = 6^{-x}$

$$y = \left(\frac{1}{6}\right)^x \quad \therefore \quad \log_{\frac{1}{6}}$$
$$\log_{\frac{1}{6}} y = \log_{\frac{1}{6}} \left(\frac{1}{6}\right)^x$$
$$\log_{\frac{1}{6}} y = x$$
$$\log_{\frac{1}{6}} x = y \rightarrow f^{-1}(x) = \log_{\frac{1}{6}} x$$

3. Investiga las magnitudes y aplica el modelo:
$Log\ E = 1{,}5\ M + 11{,}8 \rightarrow E = 10^{1{,}5\ M + 11{,}8}$

a. Magnitud de Valdivia 1960: 9,6 Ritcher:
$\rightarrow E = 10^{1{,}5\ \cdot 9{,}6 + 11{,}8} = 10^{26{,}2} = 158.489.319.246.111.348.520.210.137{,}33915$ ergios
Magnitud terremoto 2010: 8,8 Ritcher:

$\rightarrow E = 10^{1{,}5\ \cdot 8{,}8 + 11{,}8} = 10^{25} = 10.000.000.000.000.000.000.000.000$ ergios

b. Algarrobo:
$3{,}16 \cdot 10^{23} = 10^{1{,}5\ M + 11{,}8}$ / log
$\log(3{,}16 \cdot 10^{23}) = \log 10^{1{,}5\ M + 11{,}8}$
$\log 3{,}16 + \log 10^{23} = 1{,}5\ M + 11{,}8$
$0{,}5 + 23 - 11{,}8 = 1{,}5\ M$
$23{,}5 - 11{,}8 = 1{,}5M$
$11{,}7 = 1{,}5M$
$\frac{11{,}7}{1{,}5} = M \rightarrow M = 7{,}8\ Ritcher$

Vallenar:

$1{,}9 \cdot 10^{22} = 10^{1{,}5\ M + 11{,}8}$ / log
$\log(1{,}9 \cdot 10^{22}) = \log 10^{1{,}5\ M + 11{,}8}$
$\log 1{,}9 + \log 10^{22} = 1{,}5\ M + 11{,}8$
$0{,}28 + 22 - 11{,}8 = 1{,}5\ M$
$22{,}28 - 11{,}8 = 1{,}5M$
$10{,}48 = 1{,}5M$
$\frac{10{,}48}{1{,}5} = M \rightarrow M = 6{,}9\ Ritcher$