FUNZIONE LOGARITMICA: RAPPRESENTAZIONE GRAFICA

Definizione di logaritmo

Il logaritmo in base a (con $a>0$) di argomento x è l'esponente b da dare alla base a per ottenere x, cioè $\underbrace{\log_a x = b}_{\text{simbolo}}$ significa $a^b = x$

NB: dovrà essere $x>0$ (poiché è $a^b>0$)

Esempi di calcolo

$\log_3 9 = ?\ 2 \qquad 3^{?} = 9 = 3^2$

$\log_3 81 = ?\ 4 \qquad 3^{?} = 81 = 3^4$

$\log_3 1 = ?\ 0 \qquad 3^{?} = 1 = 3^0$

$\log_3 3 = ?\ 1 \qquad 3^{?} = 3 = 3^1$

$\cancel{\log_3 0 = ?} \qquad 3^{?} = 0$ impossibile

$\cancel{\log_3 (-1) = ?} \qquad 3^{?} = -1$ impossibile

$\cancel{\log_3 (-3) = ?} \qquad 3^{?} = -3$ impossibile

$\log_3 \frac{1}{3} = ?\ -1 \qquad 3^{?} = \frac{1}{3} = 3^{-1}$

$\log_3 \frac{1}{9} = ?\ -2 \qquad 3^{?} = \frac{1}{9} = 3^{-2}$

$\log_3 \sqrt{3} = ?\ \frac{1}{2} \qquad 3^{?} = \sqrt{3} = 3^{\frac{1}{2}}$

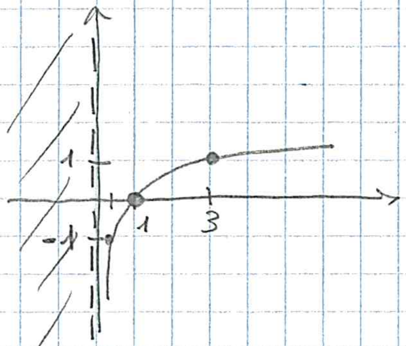
$\log_{\frac{1}{3}} 3 = ?\ -1 \qquad \left(\frac{1}{3}\right)^{?} = 3 = \left(\frac{1}{3}\right)^{-1}$

Funzione logaritmica

$f(x) = \log_3 x$

$D_f: x > 0$

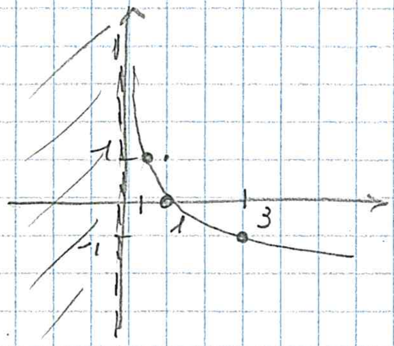
x	y
$\cancel{0}$	
1	$\log_3 1 = 0$
3	$\log_3 3 = 1$
$\frac{1}{3}$	$\log_3 \frac{1}{3} = -1$



$f(x) = \log_{\frac{1}{3}} x$

$D_f: x > 0$

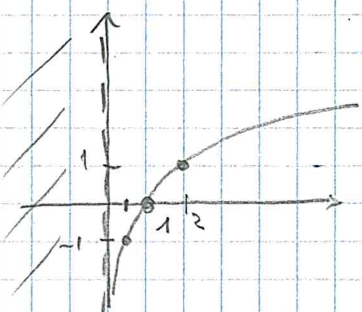
x	y
$\cancel{0}$	
1	$\log_{\frac{1}{3}} 1 = 0$
3	$\log_{\frac{1}{3}} 3 = -1$
$\frac{1}{3}$	$\log_{\frac{1}{3}} \frac{1}{3} = 1$



$f(x) = \log_2 x$

$D_f: x > 0$

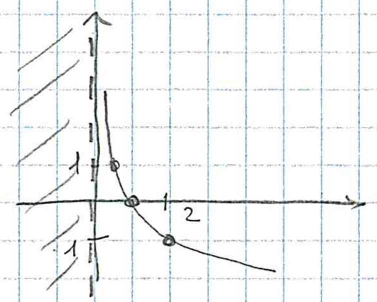
x	y
$\cancel{0}$	
1	$\log_2 1 = 0$
2	$\log_2 2 = 1$
$\frac{1}{2}$	$\log_2 \frac{1}{2} = -1$



$f(x) = \log_{\frac{1}{2}} x$

$D_f: x > 0$

x	y
$\cancel{0}$	
1	$\log_{\frac{1}{2}} 1 = 0$
2	$\log_{\frac{1}{2}} 2 = -1$
$\frac{1}{2}$	$\log_{\frac{1}{2}} \frac{1}{2} = 1$

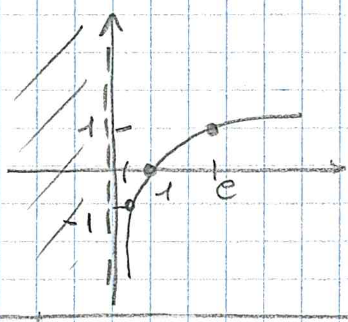


✱ $f(x) = \log_{e} x = \ln x$

base e — logaritmo naturale

$D_f: x > 0$

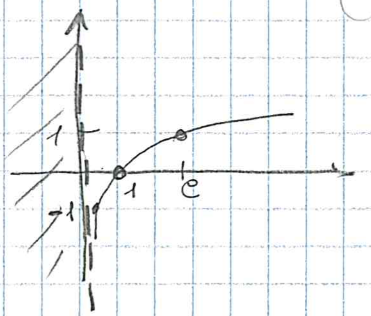
x	y
$\cancel{0}$	
1	$\ln 1 = 0$
e	$\ln e = 1$
$\frac{1}{e}$	$\ln \frac{1}{e} = -1$



$f(x) = \log_{\frac{1}{e}} x$

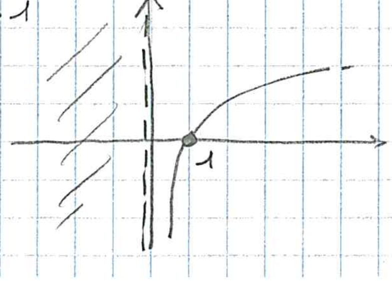
$D_f: x > 0$

x	y
$\cancel{0}$	
1	$\log_{\frac{1}{e}} 1 = 0$
e	$\log_{\frac{1}{e}} e = -1$
$\frac{1}{e}$	$\log_{\frac{1}{e}} \frac{1}{e} = 1$



Quindi la funzione logaritmica con $a > 0$ e $a \neq 1$ è $f(x) = \log_a x$ è $D_f: x > 0$

se $a > 1$



se $0 < a < 1$