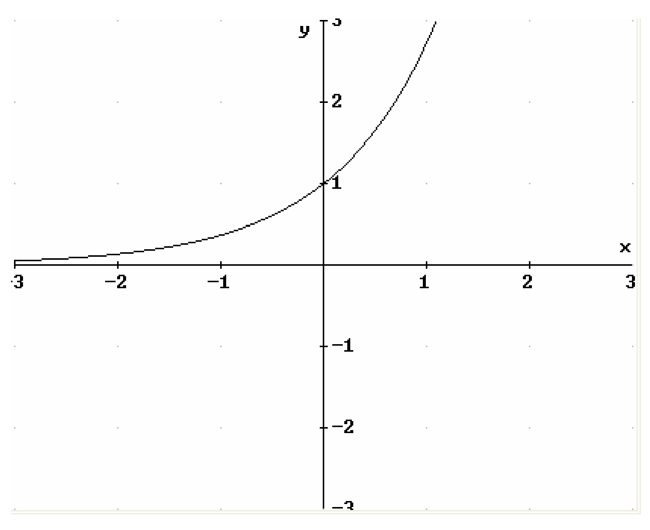
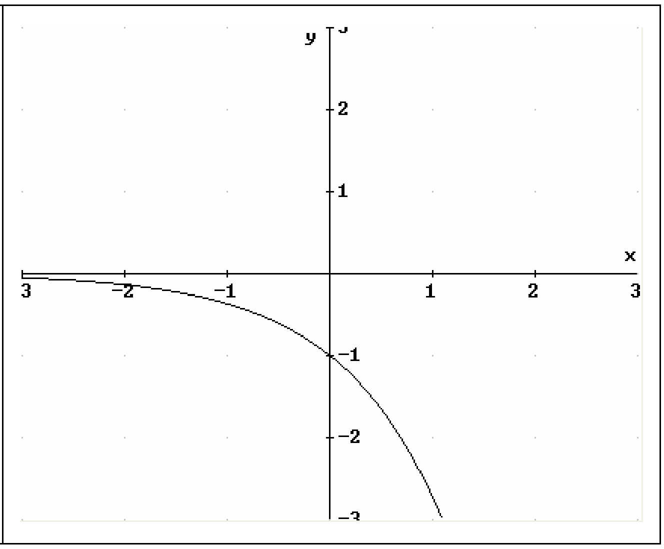
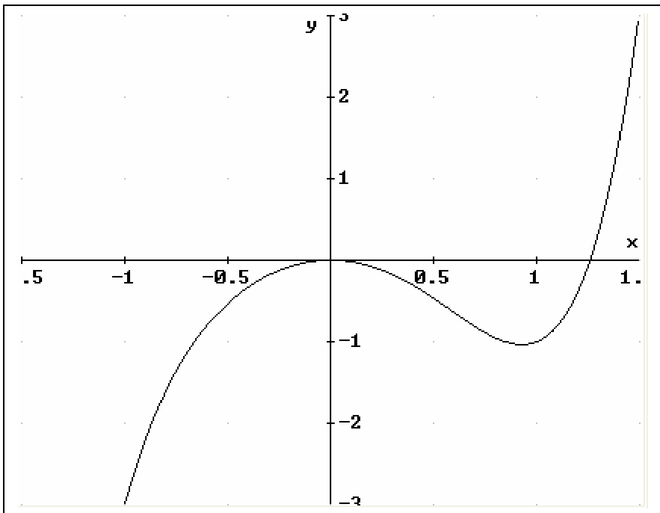
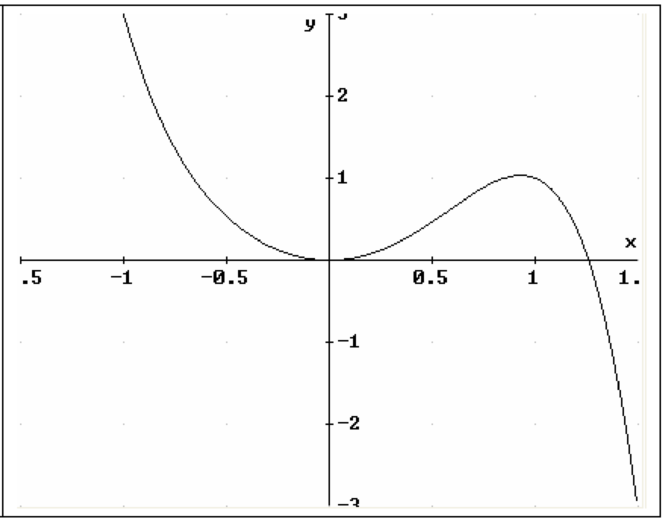
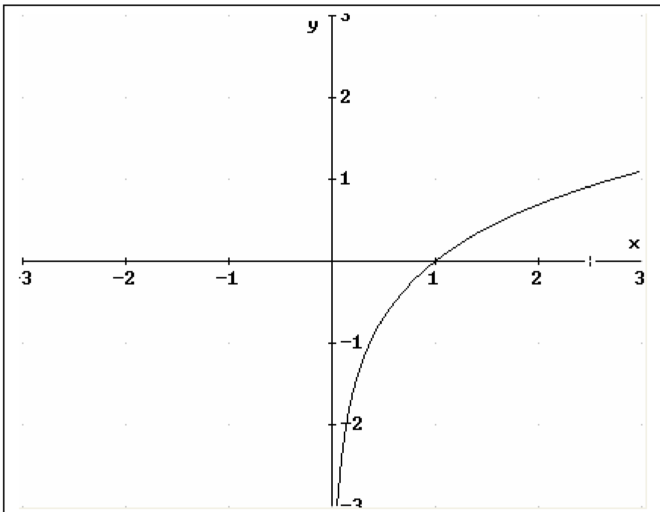
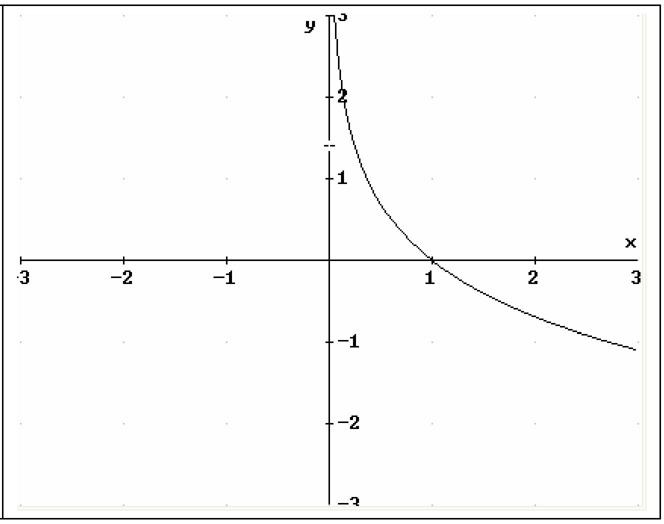
Funzione opposta $y = -f(x)$

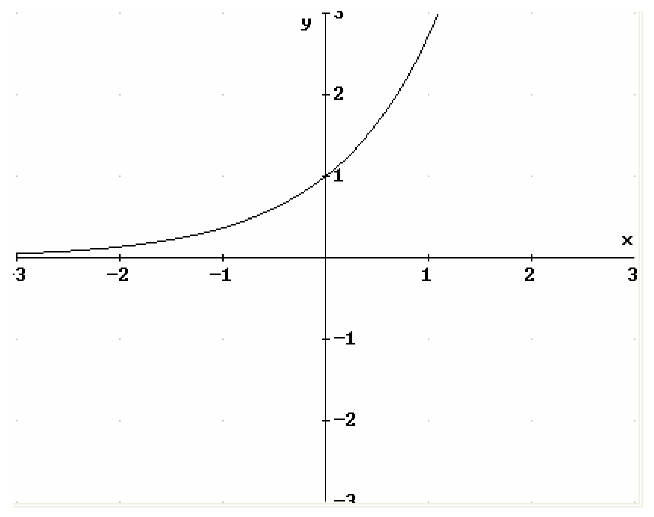
Il grafico della funzione $-f(x)$ si ottiene simmetrizzando rispetto all'asse x, il grafico della funzione $f(x)$.

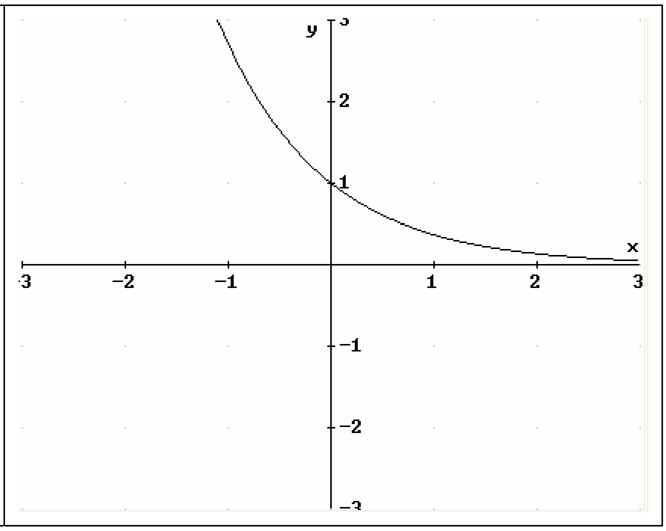
$f(x)$	$-f(x)$
	
	
	

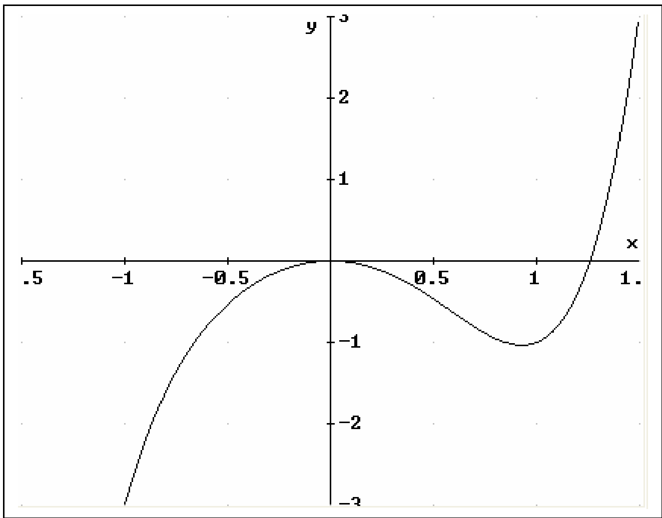
Funzione simmetrica $y = f(-x)$

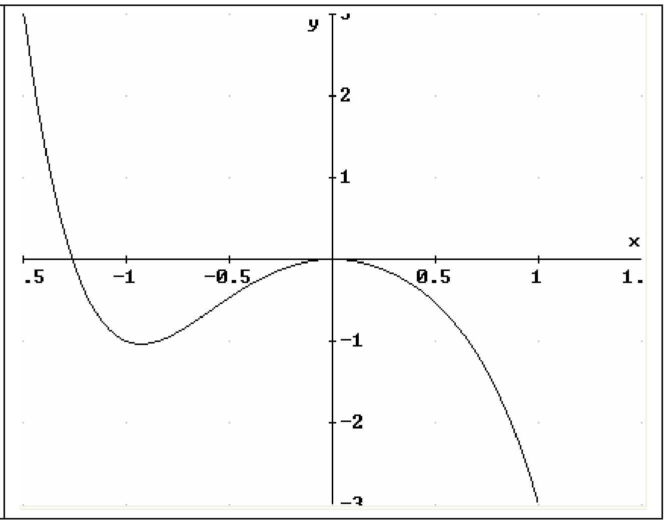
Il grafico della funzione $f(-x)$ si ottiene simmetrizzando rispetto all'asse y, il grafico della funzione $y = f(x)$.

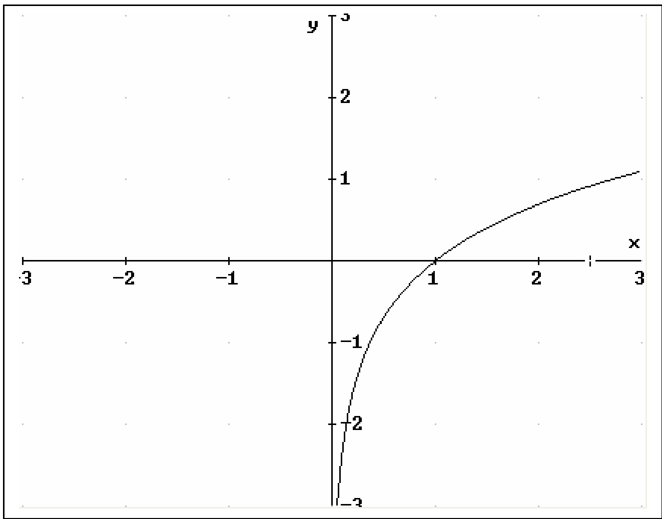
$f(x)$	$f(-x)$

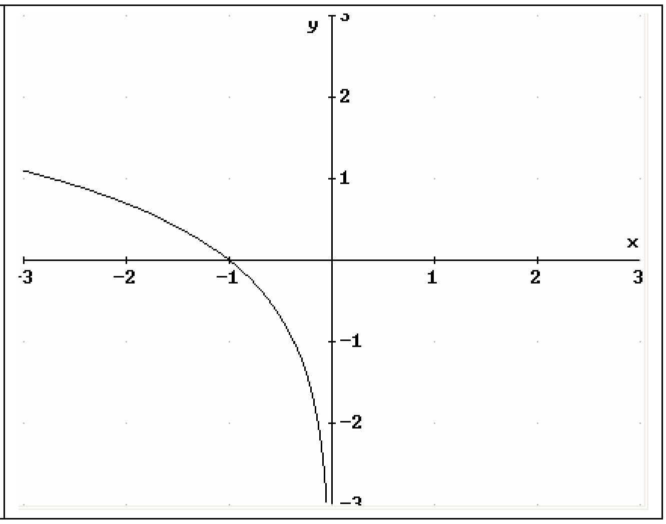






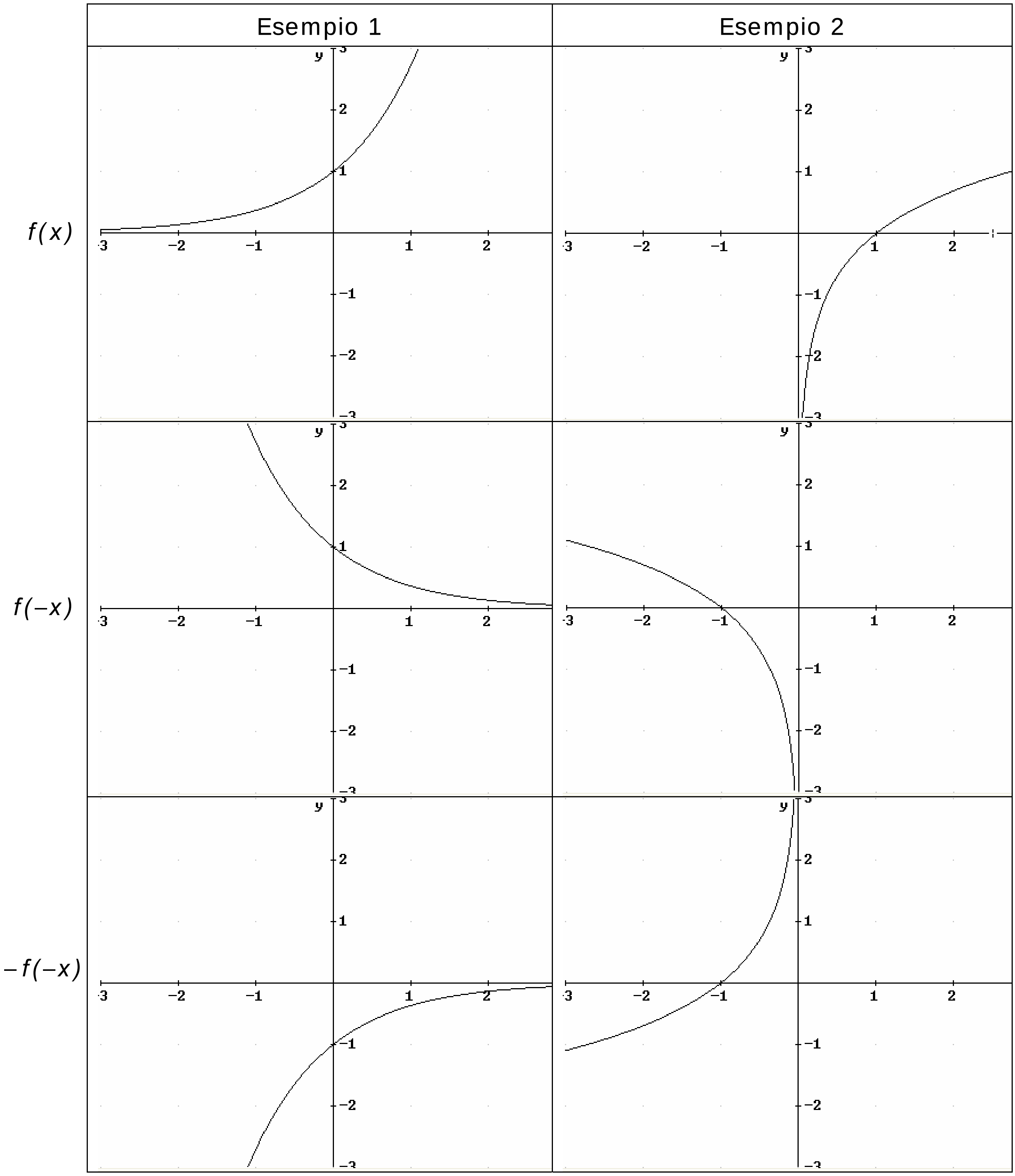






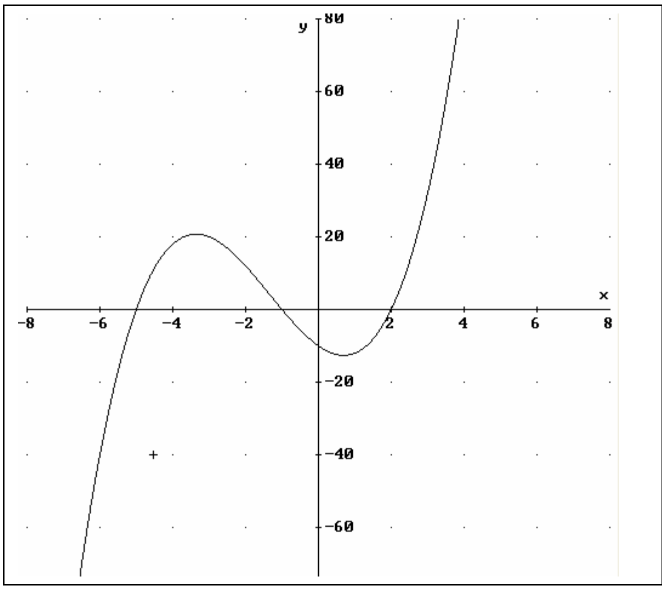
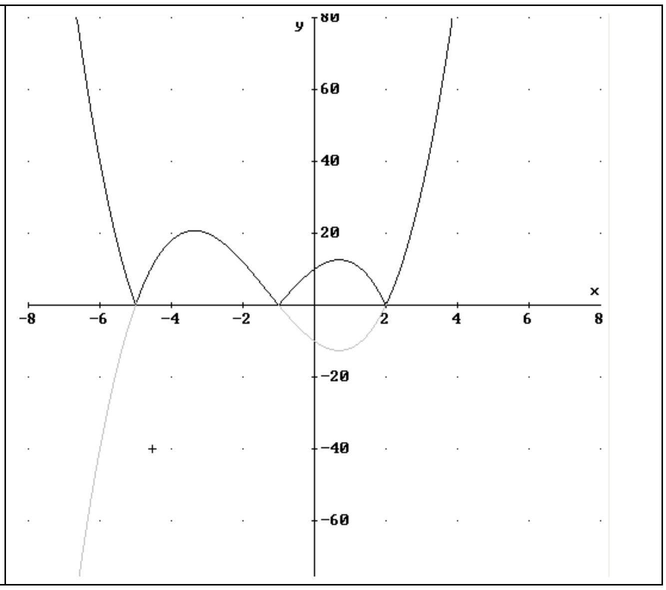
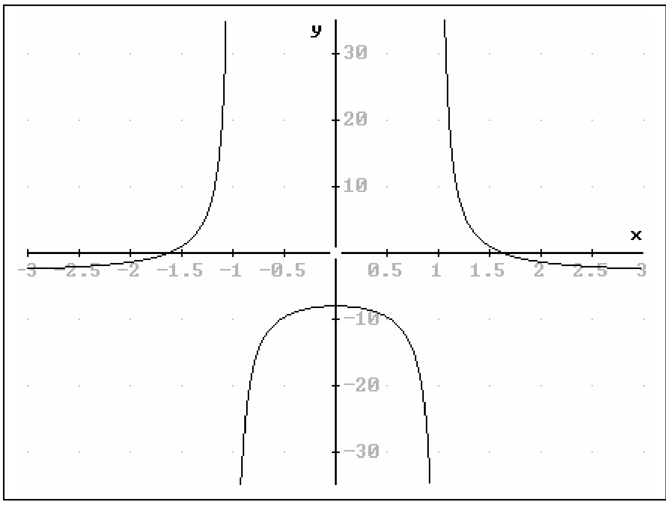
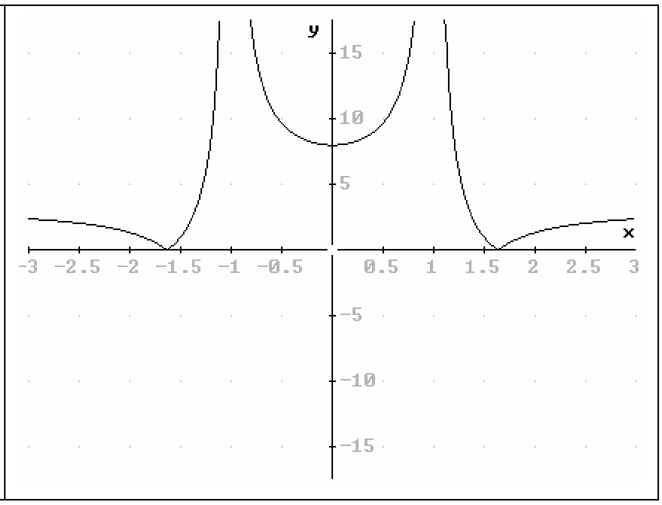
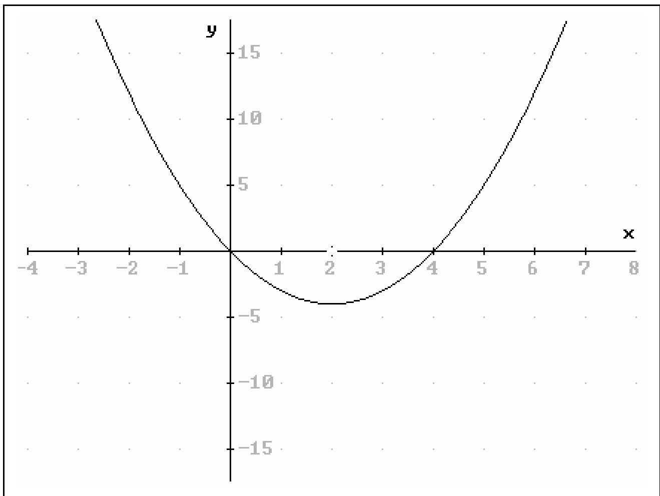
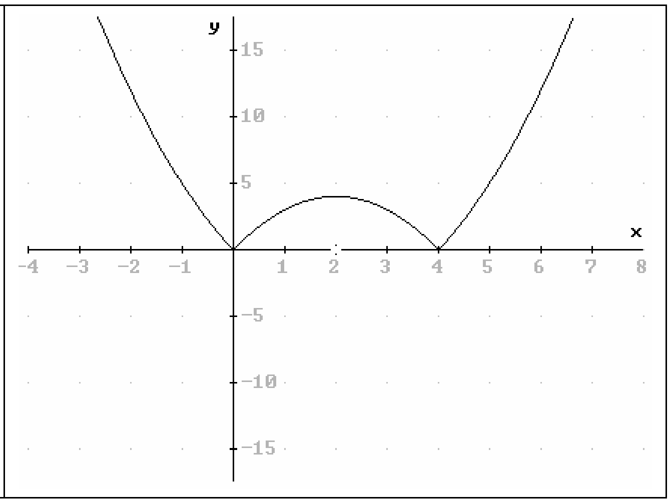
Funzione simmetrica dell'opposto $y = -f(-x)$

Il grafico della funzione $-f(-x)$ è il simmetrico rispetto all'origine di quello della funzione $f(x)$. Esso si ottiene simmetrizzando il grafico della funzione $f(x)$. prima rispetto all'asse y e poi rispetto all'asse x (o viceversa),



Funzione valore assoluto (1) $y = |f(x)|$

Il grafico della funzione $|f(x)|$ si ottiene tracciando il grafico della funzione $y = f(x)$ ed in seguito simmetrizzando rispetto all'asse x la parte di grafico che si trova sotto l'asse x. I punti di intersezione con l'asse x sono punti angolosi.

$f(x)$	$\|f(x)\|$
	
	
	

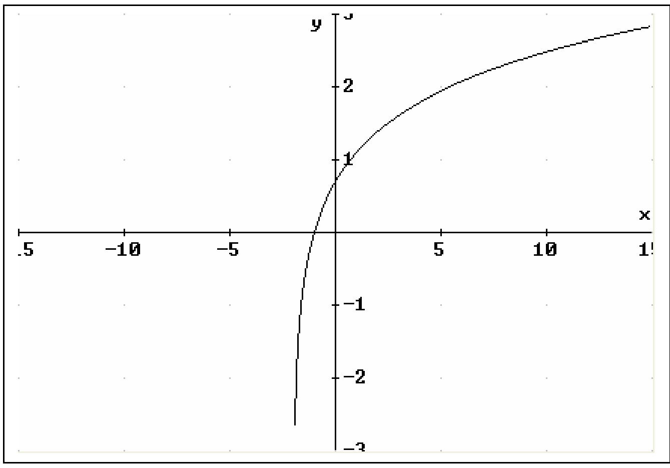
Funzione valore assoluto (2) $y = f(|x|)$

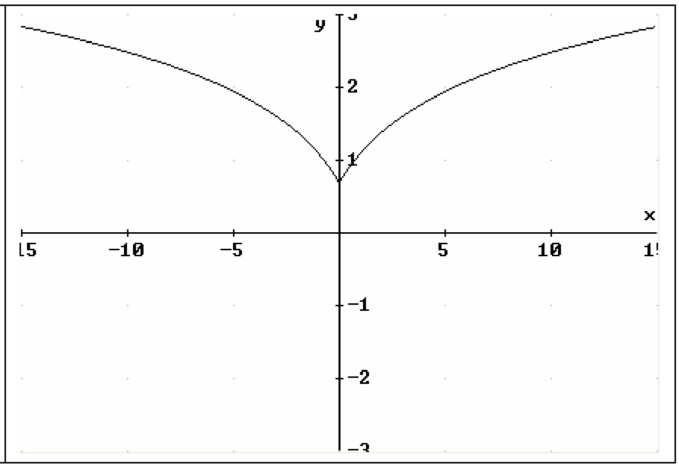
Il grafico della funzione $f(|x|)$ è costituito:

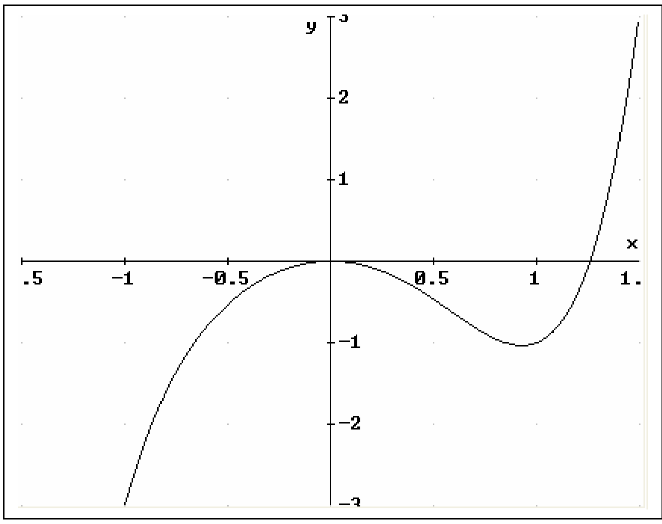
- nel semipiano $x \geq 0$, dal grafico della funzione $f(x)$
- nel semipiano $x < 0$, dal grafico simmetrico rispetto all'asse y della funzione $f(x)$.

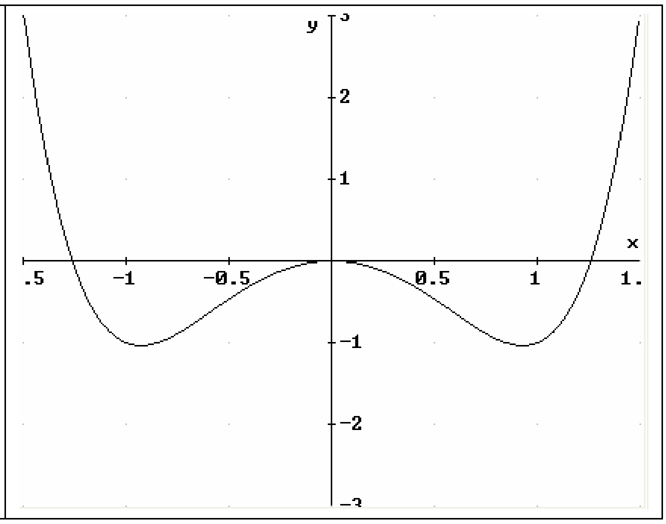
I punti di intersezione con l'asse y sono punti angolosi.

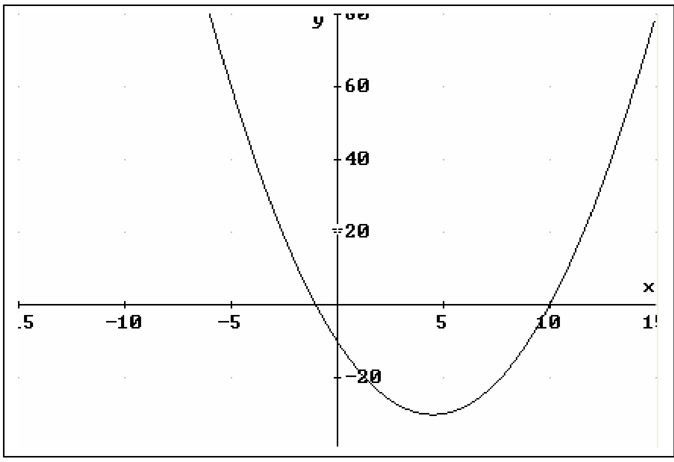
$f(x)$	$\lvert f(x) \rvert$

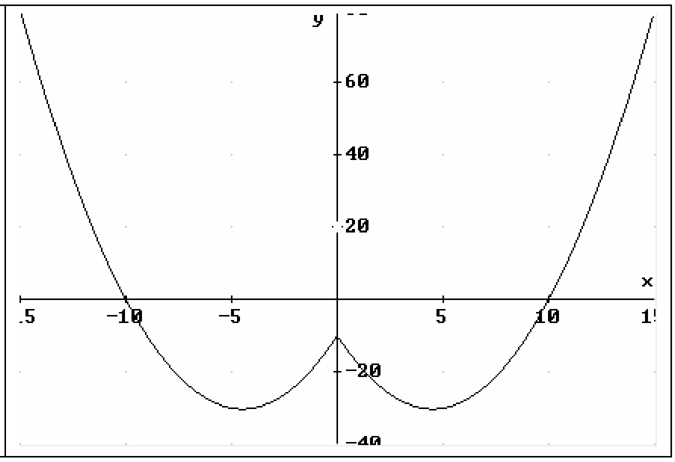








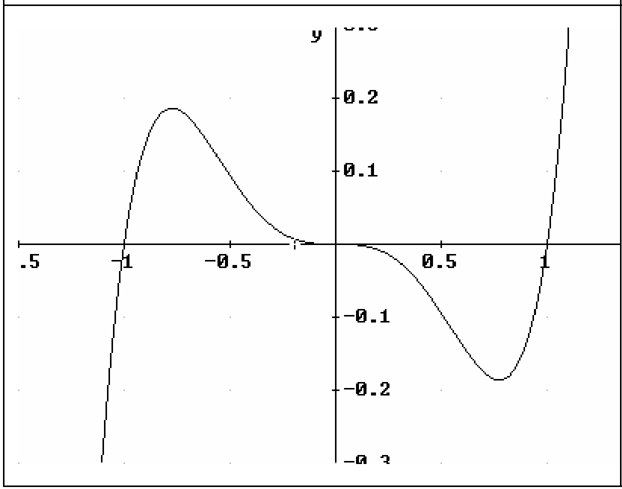
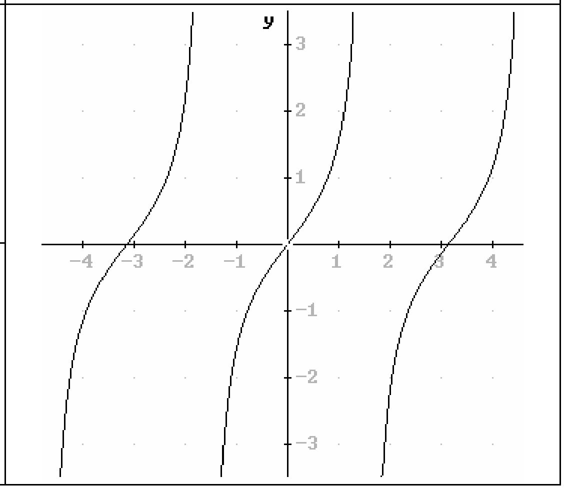
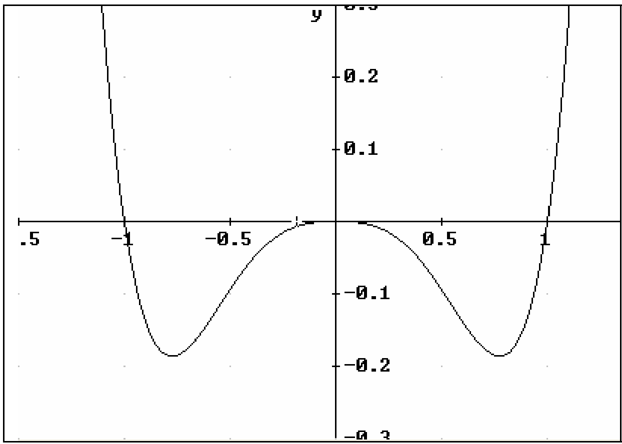
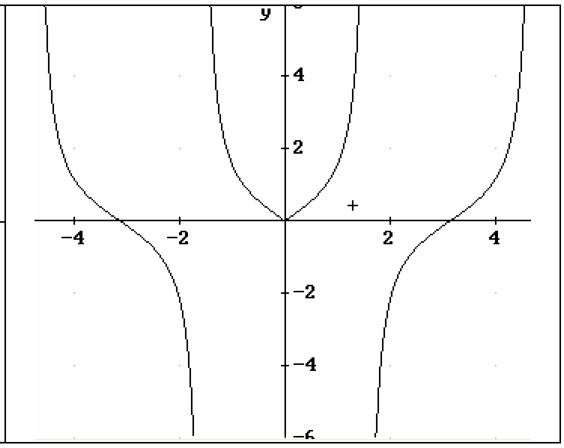
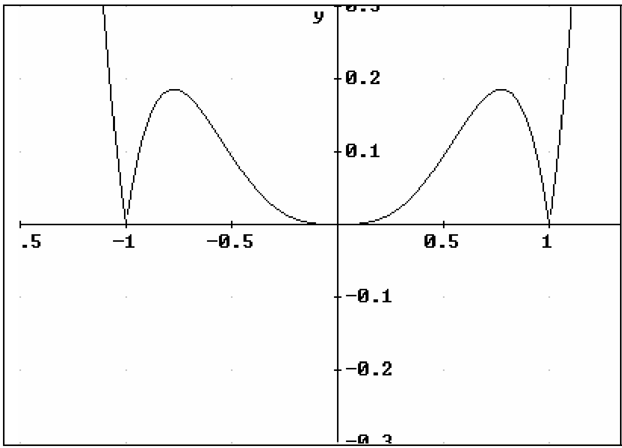
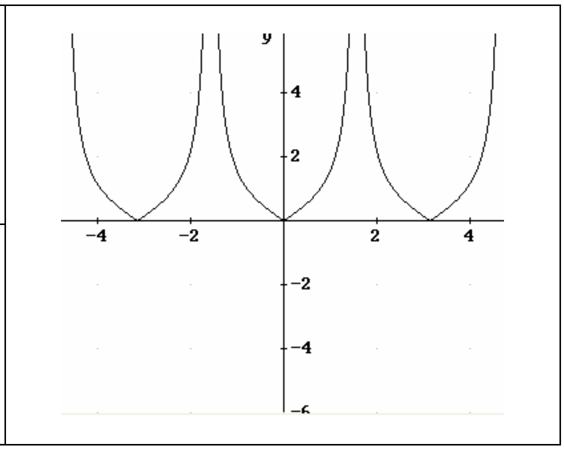




Funzione valore assoluto (3) $y = \left| f\left(|x|\right) \right|$

Il grafico della funzione $\left| f\left(|x|\right) \right|$ si costruisce con il seguente procedimento:

- si traccia il grafico di $f(x)$
- si traccia il grafico di $f\left(|x|\right)$
- si traccia il grafico $\left| f\left(|x|\right) \right|$.
- Tutti i punti di intersezione con gli assi x e y sono punti angolosi.

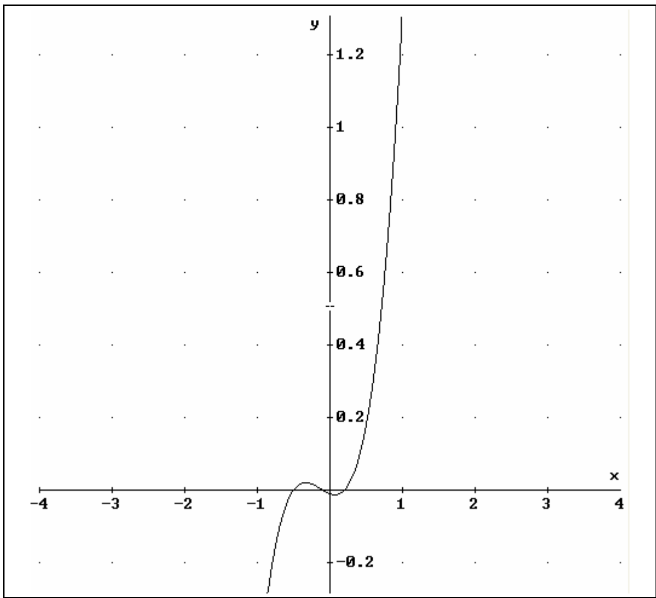
	Esempio 1	Esempio 2
$f(x)$		
$f(\lvert x \rvert)$		
$\lvert f(\lvert x \rvert) \rvert$		

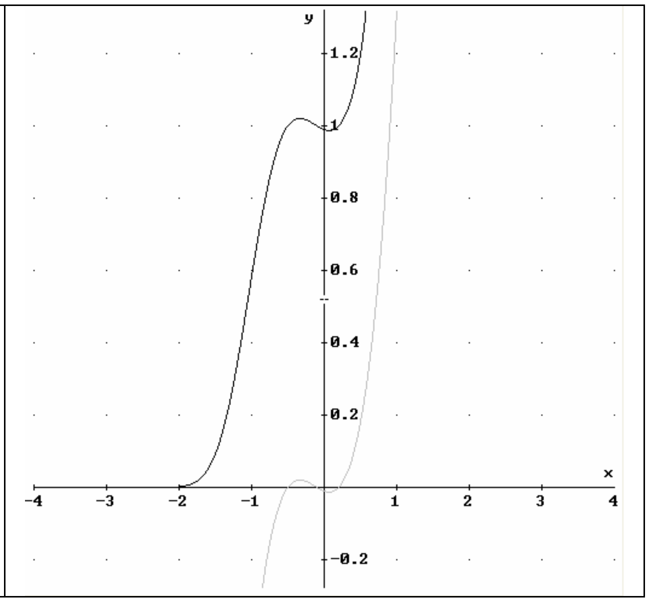
Funzione esponenziale $y = e^{f(x)}$

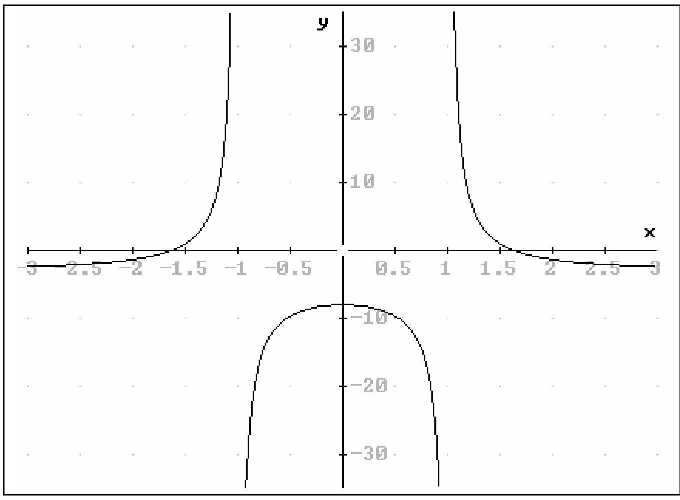
Il grafico della funzione esponenziale $e^{f(x)}$ è tutto al di sopra dell'asse x.
Esso si ottiene da quello di $f(x)$ applicando all'esponente e , i valori significativi di $f(x)$ (massimi, minimi, incontro con gli assi).

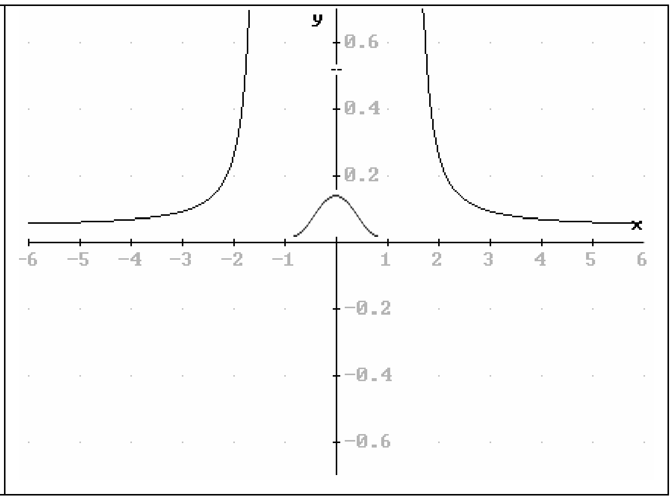
$f(x)$	$y = e^{f(x)}$
x_0 Max relativo	x_0 Max relativo
x_0 Min relativo	x_0 Min relativo
x_0 Flesso	x_0 Flesso
Nei punti in cui $f(x_0) = 0$	$e^{f(x_0)} = 1$
Se $f(x) \rightarrow +\infty$	$e^{f(x)} \rightarrow +\infty$
Se $f(x) \rightarrow -\infty$	$e^{f(x)} \rightarrow 0^+$

$f(x)$	$e^{f(x)}$

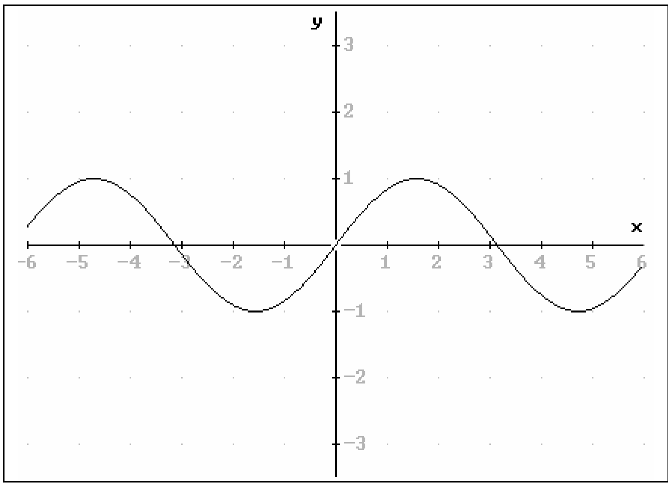


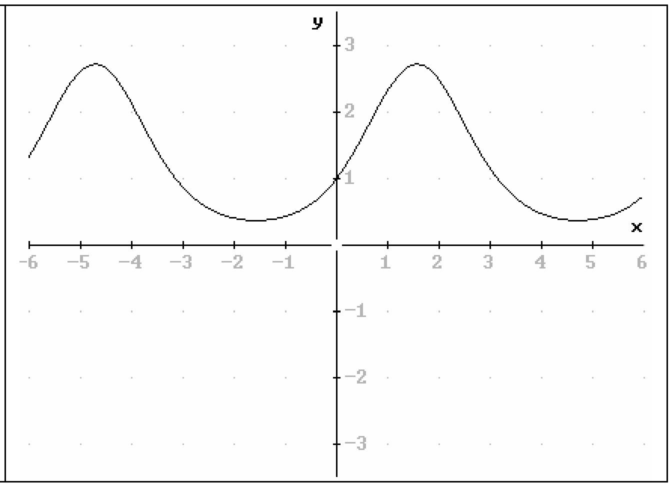


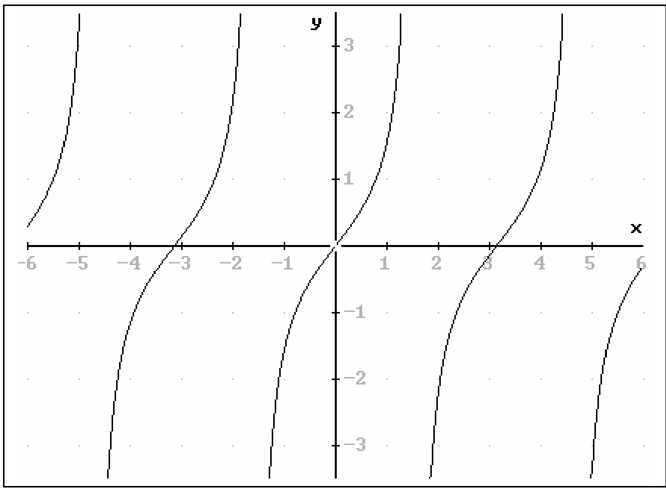


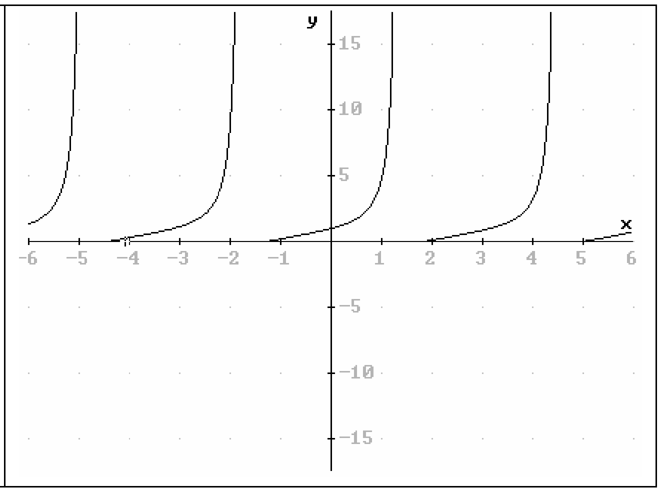


$f(x)$	$e^{f(x)}$


y
x
3 2 1 -1 -2 -3
-6 -5 -4 -3 -2 -1 1 2 3 4 5 6


y
x
3 2 1 -1 -2 -3
-6 -5 -4 -3 -2 -1 1 2 3 4 5 6

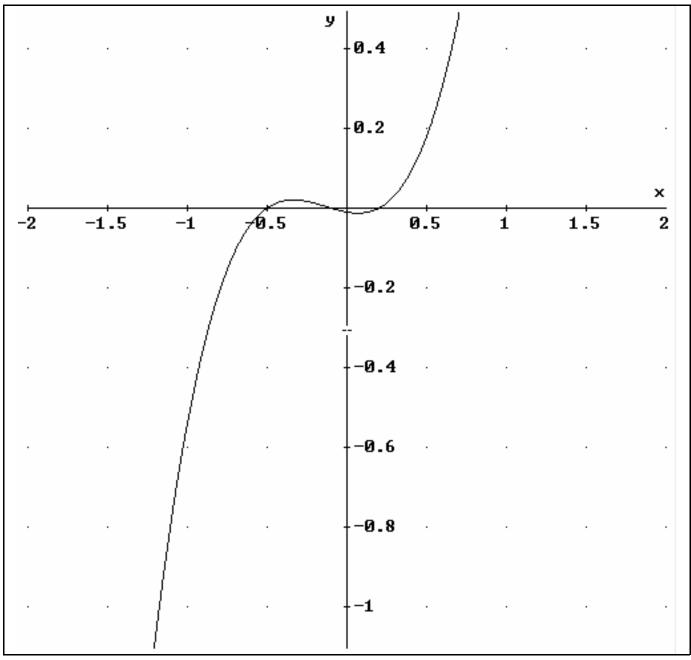
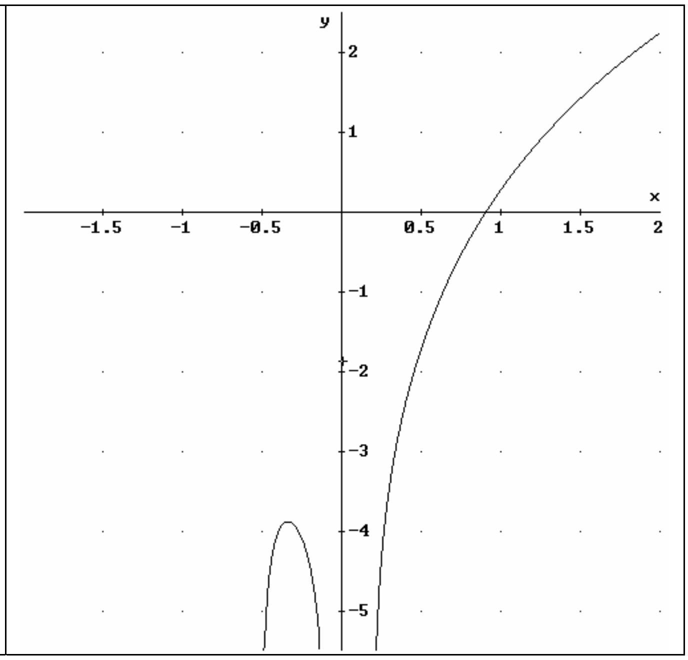
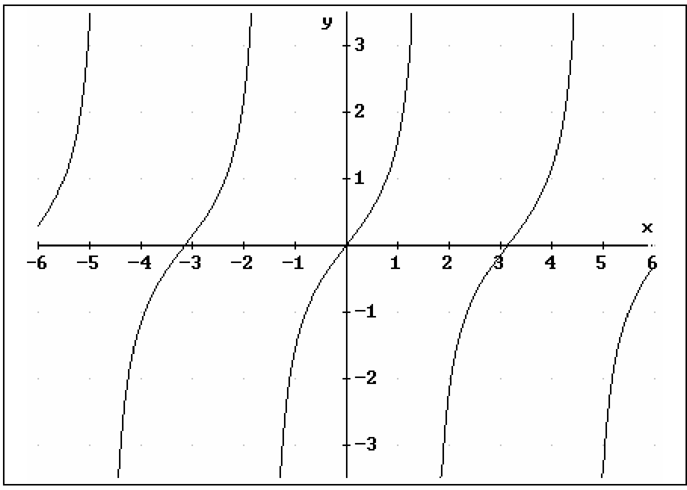
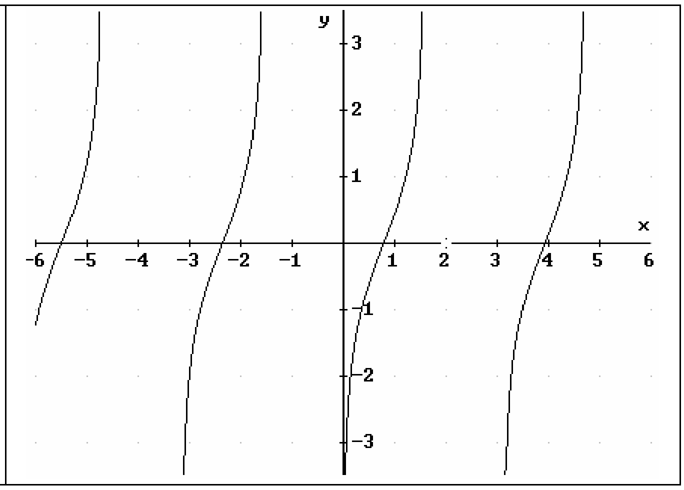

y
x
3 2 1 -1 -2 -3
-6 -5 -4 -3 -2 -1 1 2 3 4 5 6


y
x
15 10 5 -5 -10 -15
-6 -5 -4 -3 -2 -1 1 2 3 4 5 6

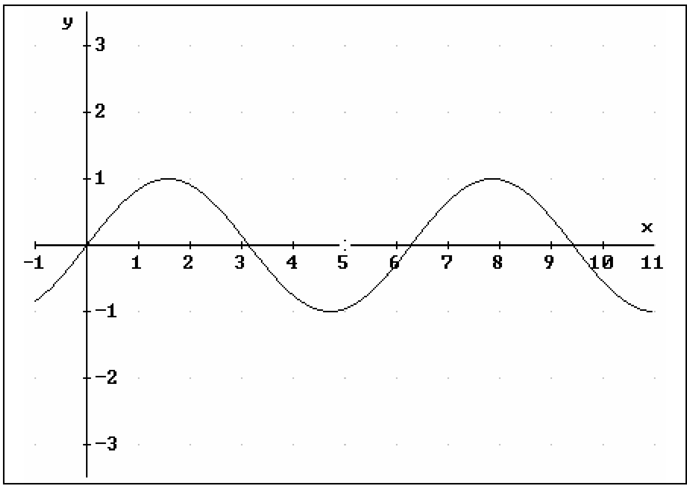
Funzione logaritmica $y = log_a\ f(x)$ (con $a > 1$)

Il grafico della funzione logaritmica $log_a\ f(x)$ si ottiene da quello della funzione $f(x)$ applicando al logaritmo i valori significativi di $f(x)$ (massimi, minimi, incontro con gli assi).

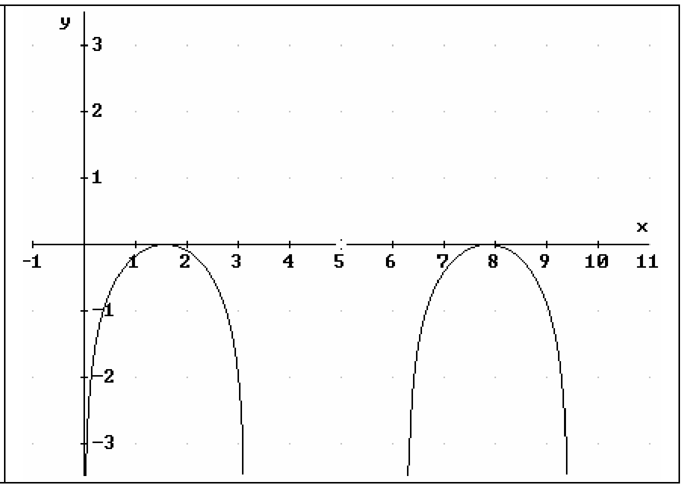
$f(x)$	$log_a\ f(x)$
x_0 Max relativo	x_0 Max relativo
x_0 Min relativo	x_0 Min relativo
Nei punti in cui $f(x_0) = 1$	$log_a\ f(x_0) = 0$
Se $f(x) \to +\infty$	$log_a f(x) \to +\infty$
Se $f(x) \to 0^+$	$log_a\ f(x) \to -\infty$
Negli intervalli dove $f(x)$ è negativa	$log_a\ f(x)$ non esiste

$f(x)$	$ln\ f(x)$
	
	

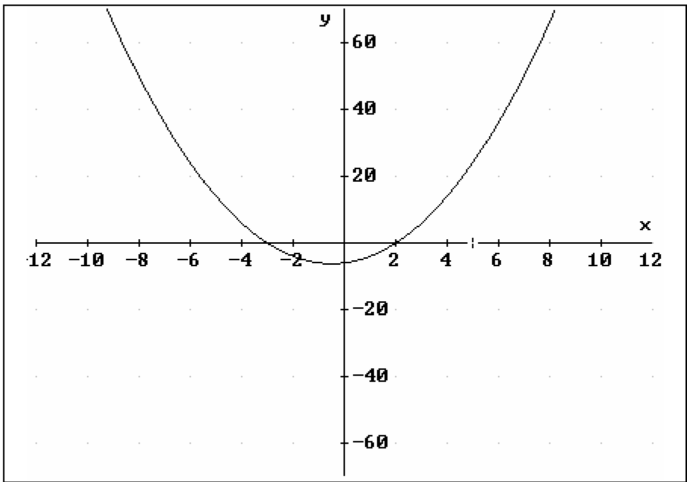
$f(x)$	$\ln f(x)$



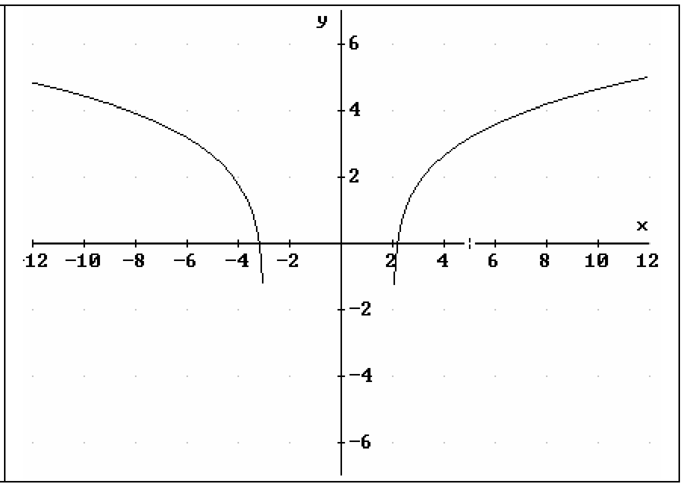
y
3
2
1
x
-1 1 2 3 4 5 6 7 8 9 10 11
-1
-2
-3



y
3
2
1
x
-1 1 2 3 4 5 6 7 8 9 10 11
-1
-2
-3



y
60
40
20
x
-12 -10 -8 -6 -4 -2 2 4 6 8 10 12
-20
-40
-60



y
6
4
2
x
-12 -10 -8 -6 -4 -2 2 4 6 8 10 12
-2
-4
-6

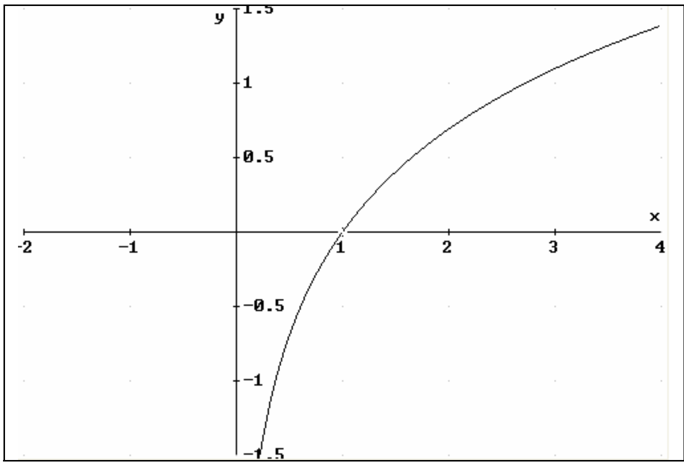
Funzione arcoseno $y = arcsen\ f(x)$

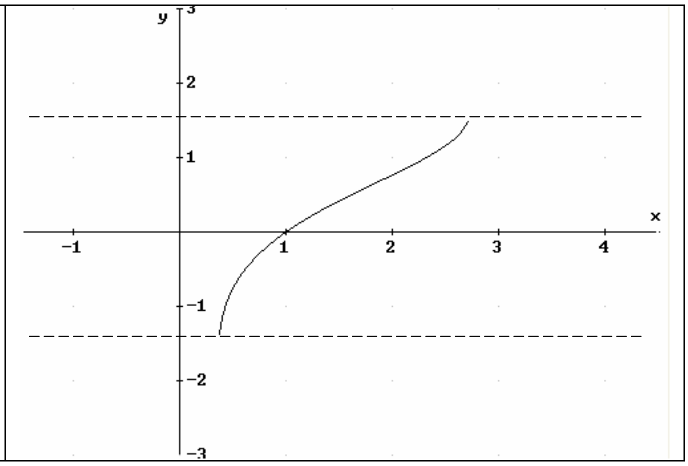
Il grafico della funzione $arcsen\ f(x)$ si ottiene considerando soltanto gli intervalli nei quali $-1 \le f(x) \le 1$.
Il grafico di $arcsen\ f(x)$ si ottiene:

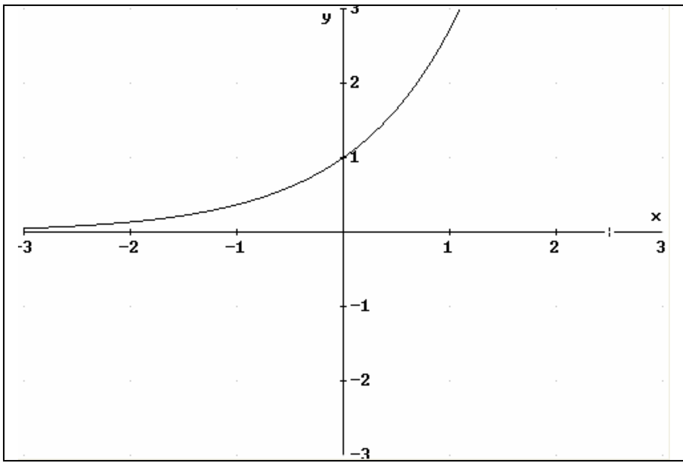
1. disegnando il suo grafico caratteristico, prendendo come centro di simmetria i punti in cui $f(x)$ tocca l'asse x e nel cui intorno la funzione è crescente;
2. disegnando il simmetrico rispetto all'asse verticale del suo grafico caratteristico, prendendo come centro di simmetria i punti in cui $f(x)$ tocca l'asse x e nel cui intorno la funzione è decrescente.

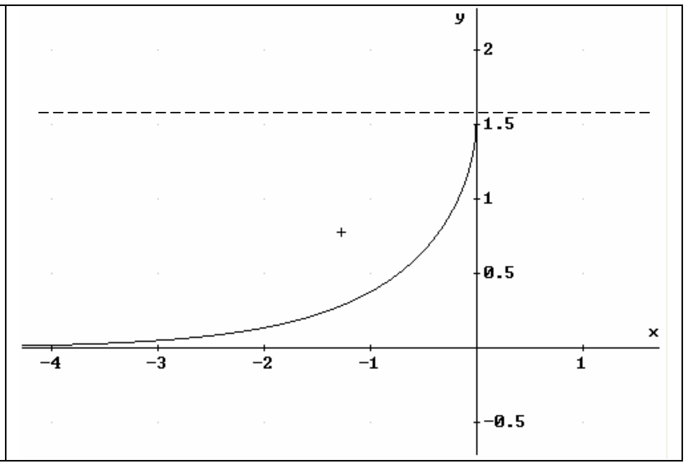
$f(x)$	$arcsen\ f(x)$
Nei punti in cui $f(x) = 0$	$arcsen\ f(x) = 0$ e in esso c'è un flesso
Nei punti in cui $f(x_0) = -1$	$arcsen\ f(x) = -\frac{\pi}{2}$
Nei punti in cui $f(x_0) = 1$	$arcsen\ f(x) = \frac{\pi}{2}$
	Il grafico di $arcsen\ f(x)$ è racchiuso fra le rette $y = -\frac{\pi}{2}$ e $y = \frac{\pi}{2}$

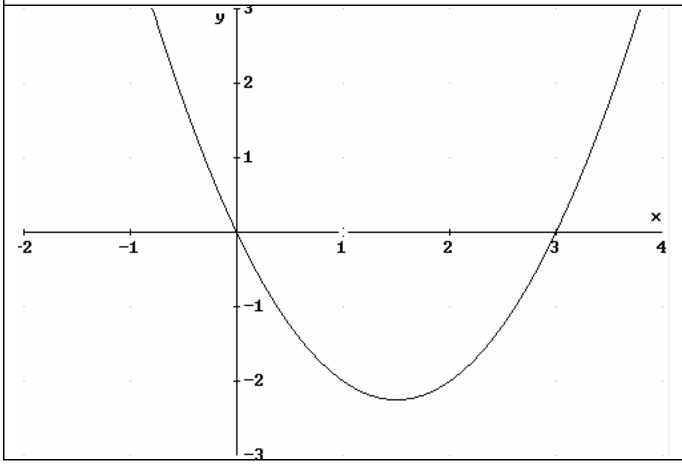
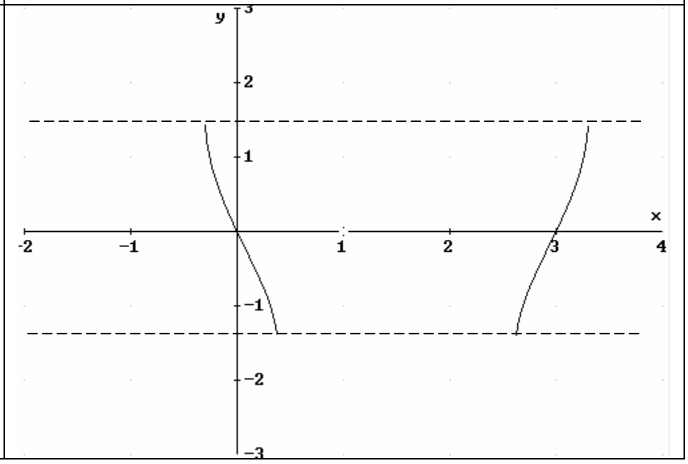
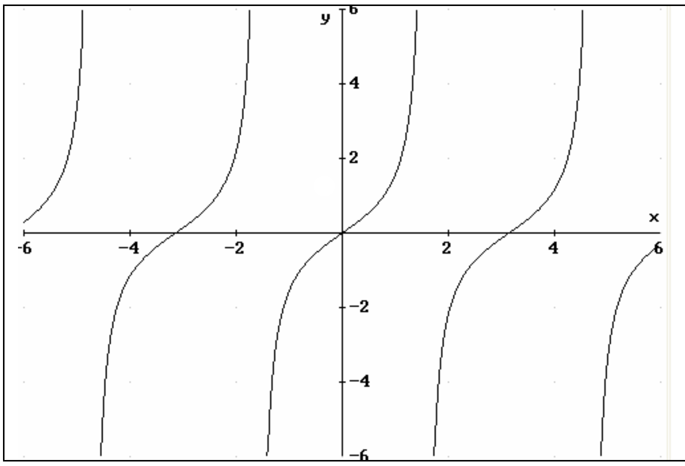
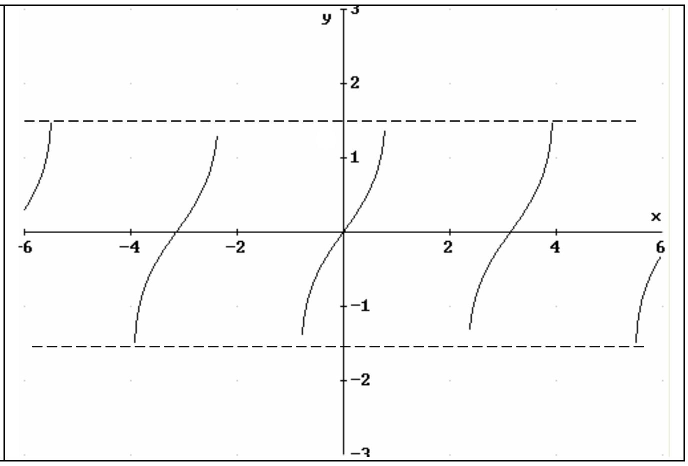
$f(x)$	$arcsen\ f(x)$







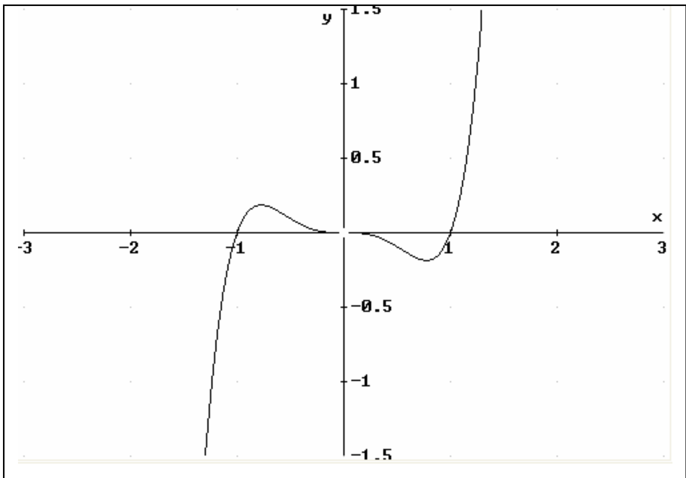
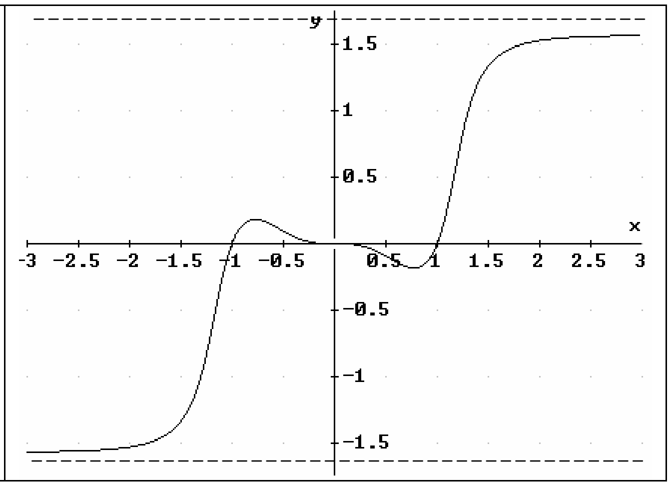
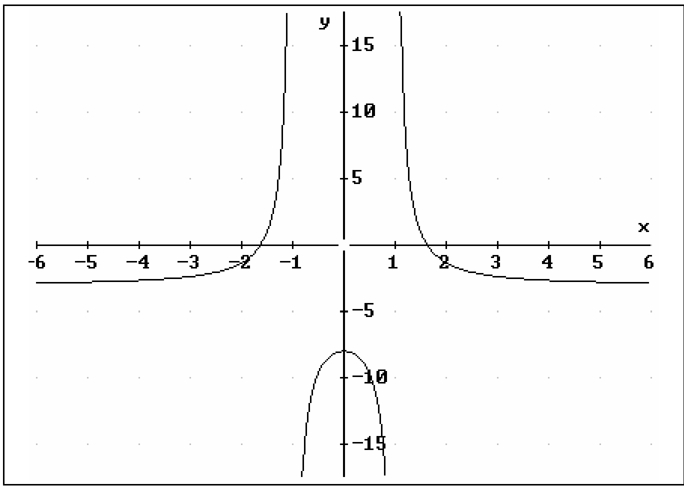
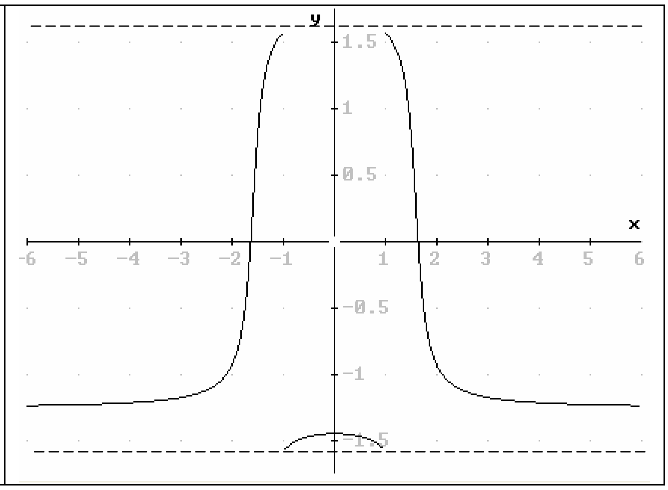


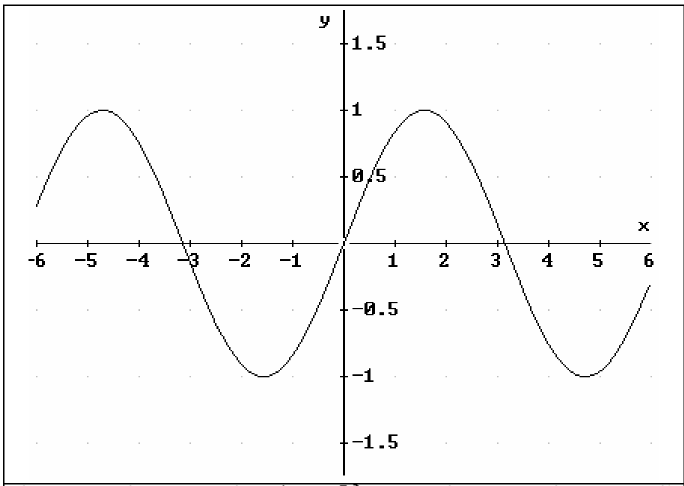
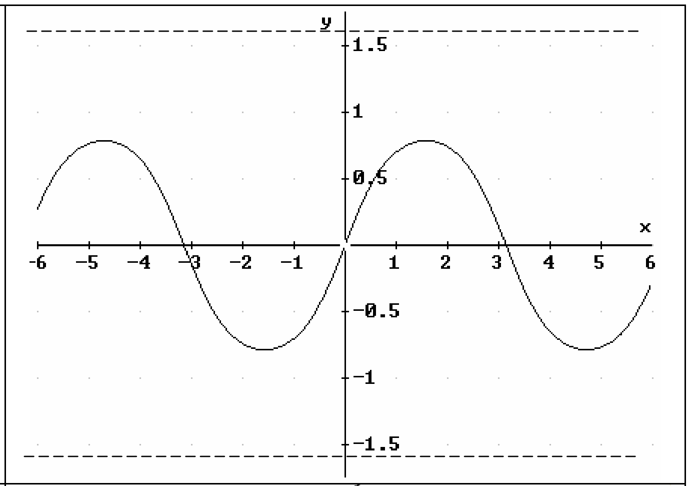
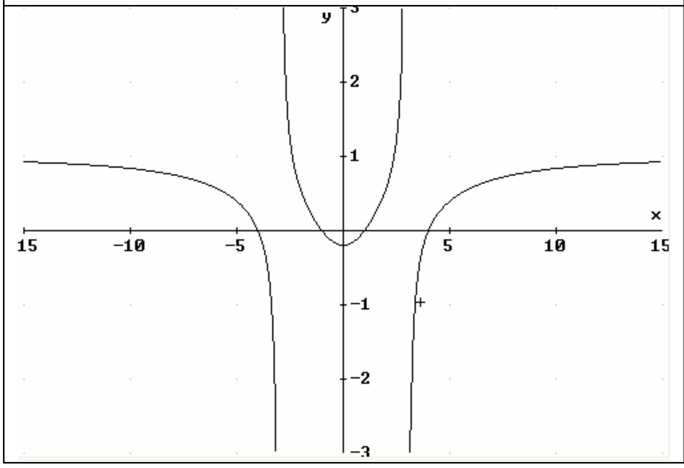
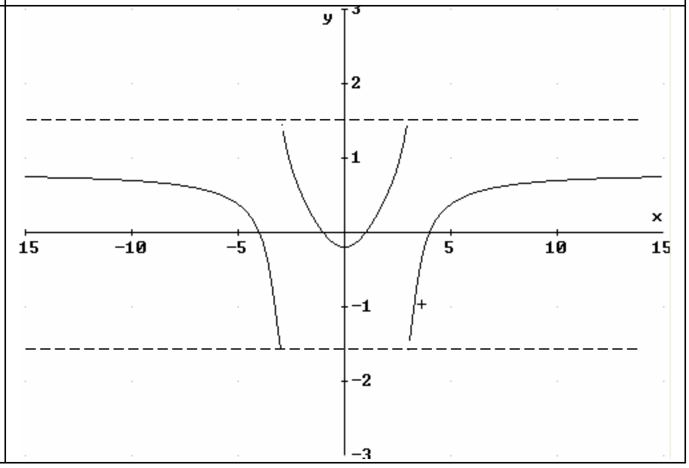
$f(x)$	$arcsen\ f(x)$
y x -2 -1 1 2 3 4 3 2 1 −1 −2 −3	y x -2 -1 1 2 3 4 3 2 1 −1 −2 −3
y x -6 -4 -2 2 4 6 6 4 2 −2 −4 −6	y x -6 -4 -2 2 4 6 3 2 1 −1 −2 −3

Funzione arcotangente $y = arctg\ f(x)$

Il grafico della funzione arcotangente $arctg\ f(x)$ si ottiene da quello della funzione $f(x)$ applicando all'arcotangente i valori significativi di $f(x)$ (massimi, minimi, incontro con gli assi).

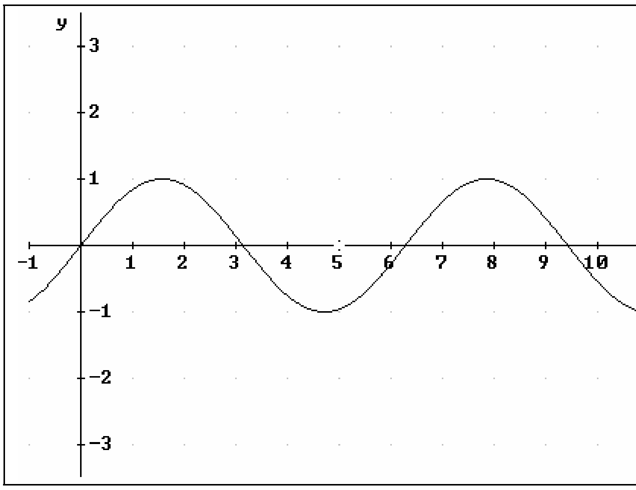
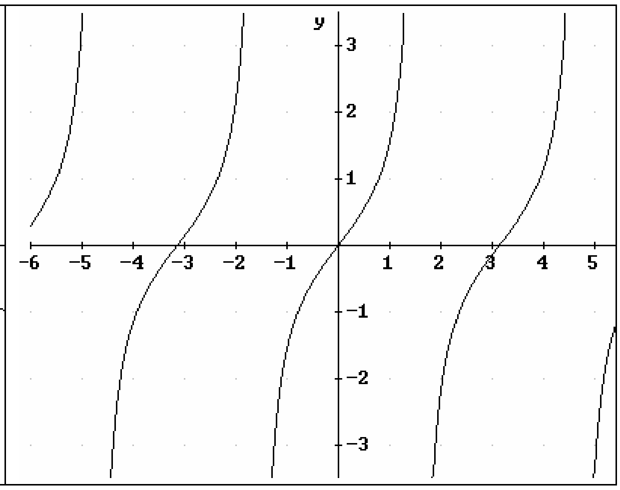
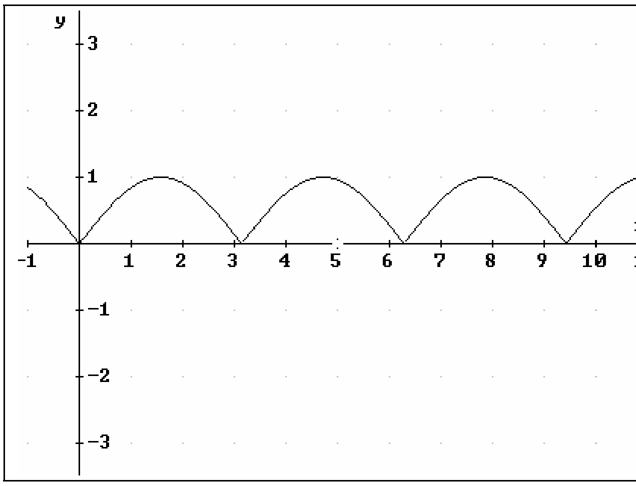
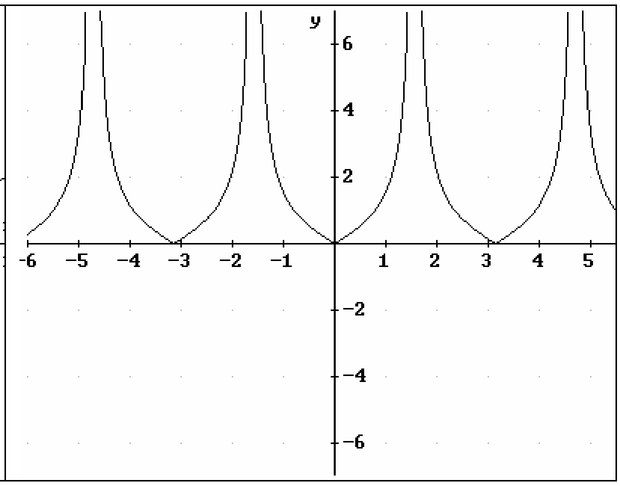
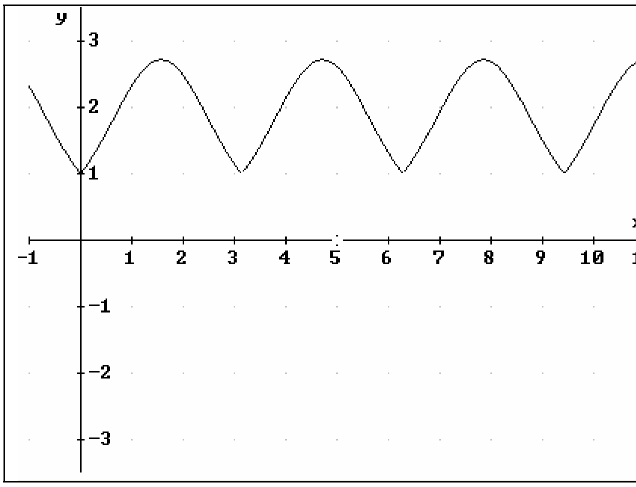
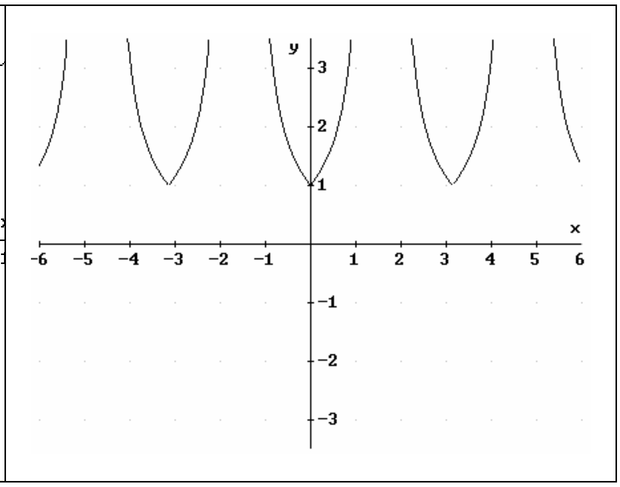
$f(x)$	$arctg\ f(x)$
x_0 Max relativo	x_0 Max relativo
x_0 Min relativo	x_0 Min relativo
x_0 Flesso relativo	x_0 Flesso relativo
Nei punti in cui $f(x) = 0$	$arctg\ f(x) = 0$
Se $f(x) \rightarrow -\infty$	$arctg\ x \rightarrow -\frac{\pi}{2}^{+}$
Se $f(x) \rightarrow +\infty$	$arctg\ x \rightarrow +\frac{\pi}{2}^{-}$
	Il grafico di $arctg\ f(x)$ è racchiuso fra le rette $y = -\frac{\pi}{2}$ e $y = \frac{\pi}{2}$

$f(x)$	$arctg\ f(x)$
	
	

$f(x)$	$arctg\ f(x)$
y x 1.5 1 0.5 −0.5 −1 −1.5 -6 −5 −4 −3 −2 −1 1 2 3 4 5 6	y x 1.5 1 0.5 −0.5 −1 −1.5 -6 −5 −4 −3 −2 −1 1 2 3 4 5 6
y x 3 2 1 −1 −2 −3 15 −10 −5 5 10 15	y x 3 2 1 −1 −2 −3 15 −10 −5 5 10 15

Funzione esponenziale con argomento in valore assoluto $y = e^{|f(x)|}$

Il grafico della funzione $y = e^{|f(x)|}$ si ottiene applicando prima le considerazioni riguardanti il valore assoluto ed in seguito quelle relative all'esponenziale.

	Esempio 1	Esempio 2
$f(x)$		
$\lvert f(x) \rvert$		
$e^{\lvert f(x) \rvert}$		

Funzione logaritmica con argomento in valore assoluto $y = log_a |f(x)| \quad (a > 1)$

Il grafico della funzione $log_a |f(x)|$ si ottiene applicando prima le considerazioni riguardanti il valore assoluto ed in seguito quelle relative al logaritmo.

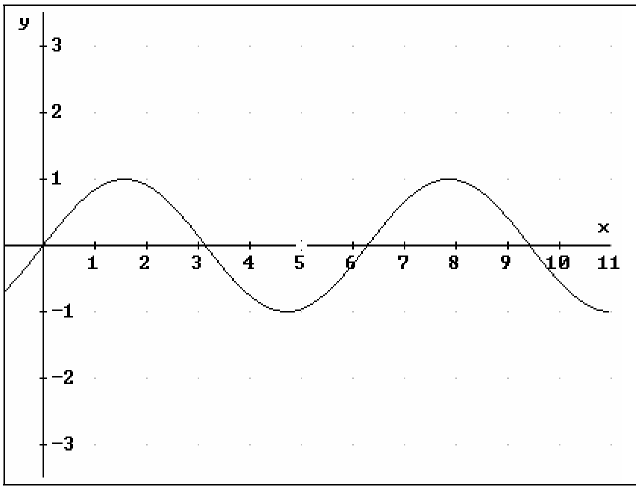
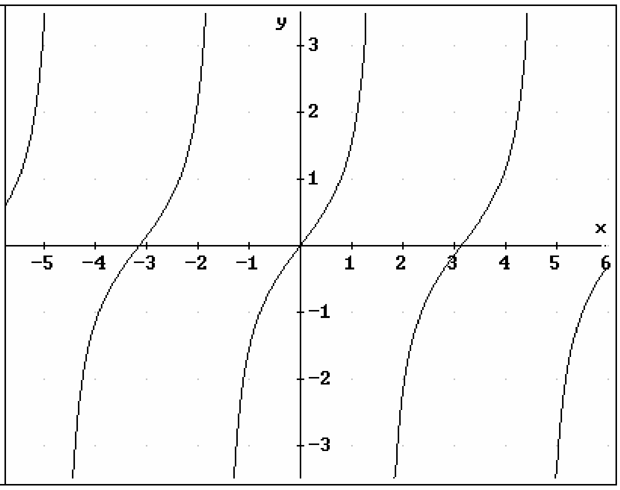
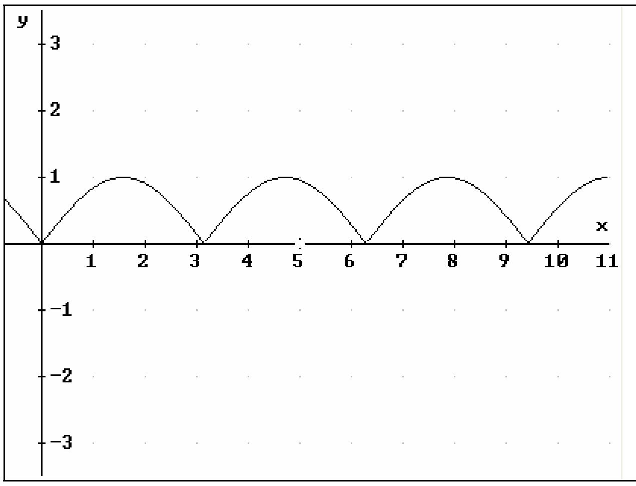
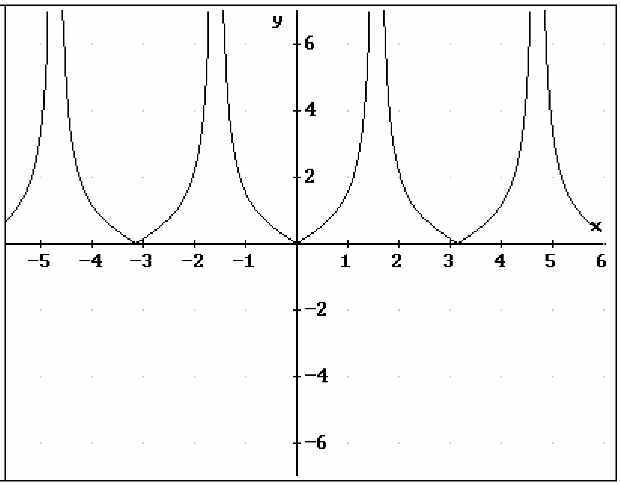
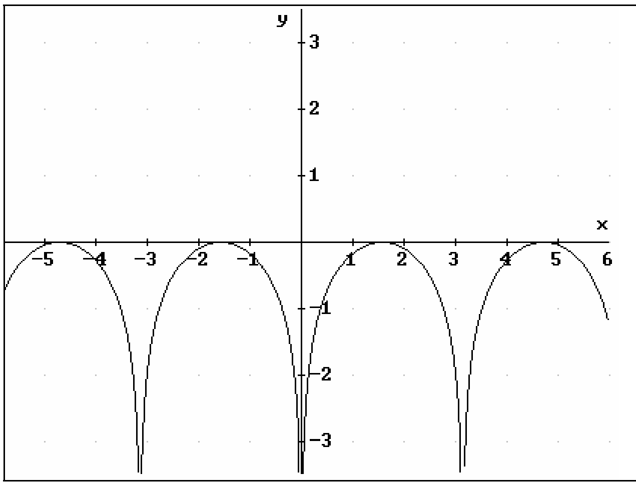
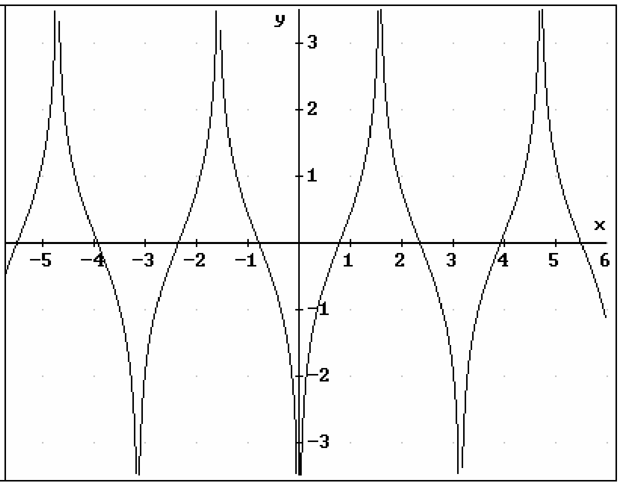
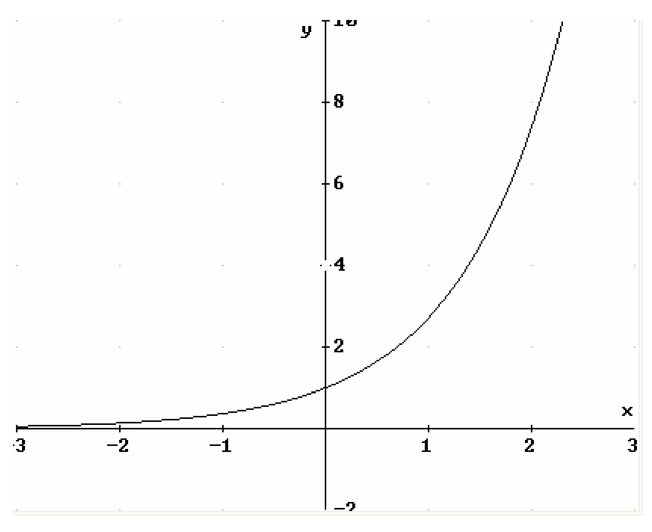
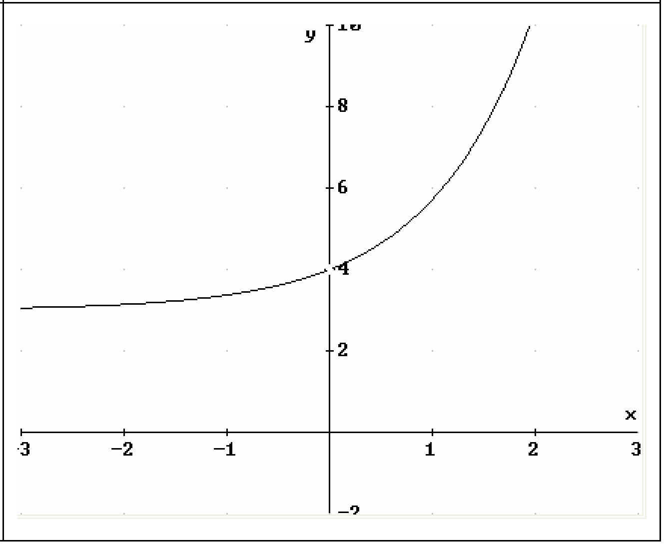
	Esempio 1	Esempio 2
$f(x)$		
$\lvert f(x) \rvert$		
$ln \lvert f(x) \rvert$		

GRAFICO TRASLATO (1) $y = f(x) + k$

Il grafico della funzione $f(x)+k$ si ottiene traslando con ampiezza k il grafico della funzione $f(x)$:

- verso l'alto se $k > 0$
- verso il basso se $k < 0$

e^x	$e^x + 3$
	

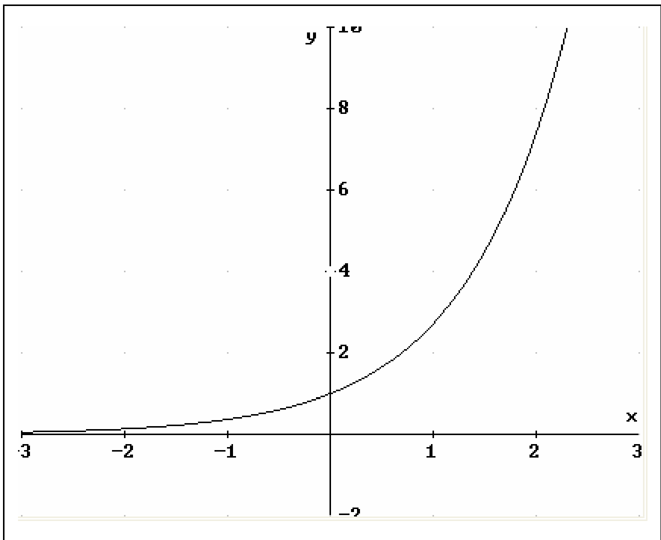
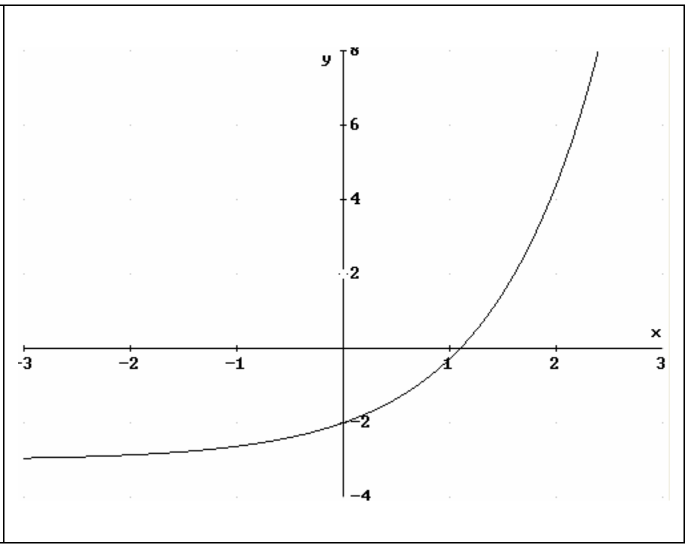
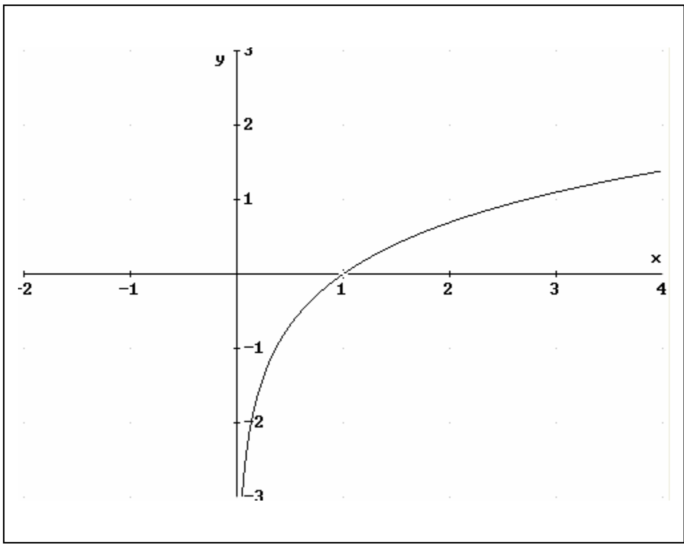
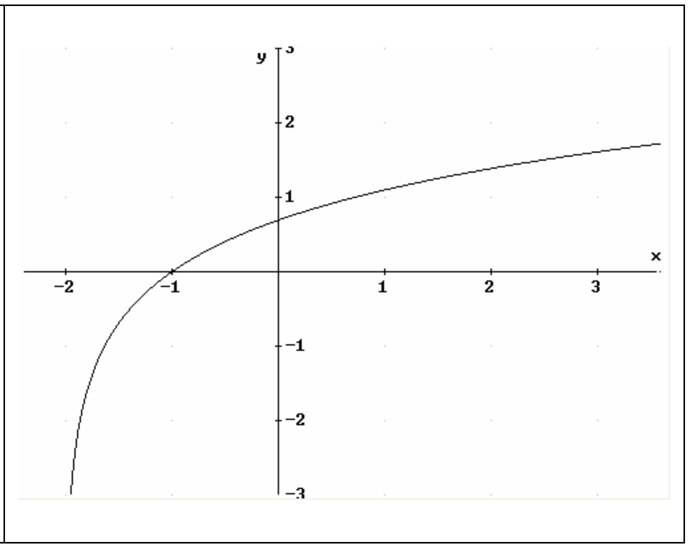
e^x	$e^x - 3$
	

GRAFICO TRASLATO (2) $y = f(x+k)$

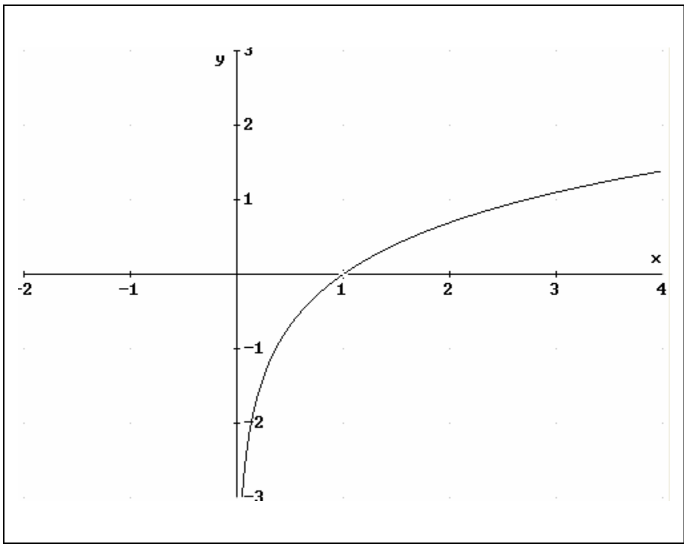
Il grafico della funzione $f(x+k)$ si ottiene traslando con ampiezza k il grafico della funzione $f(x)$:
- verso sinistra se $k > 0$
- verso destra se $k < 0$

$log_e\ x$	$log_e\ (x+2)$





$log_e\ x$	$log_e\ (x-2)$



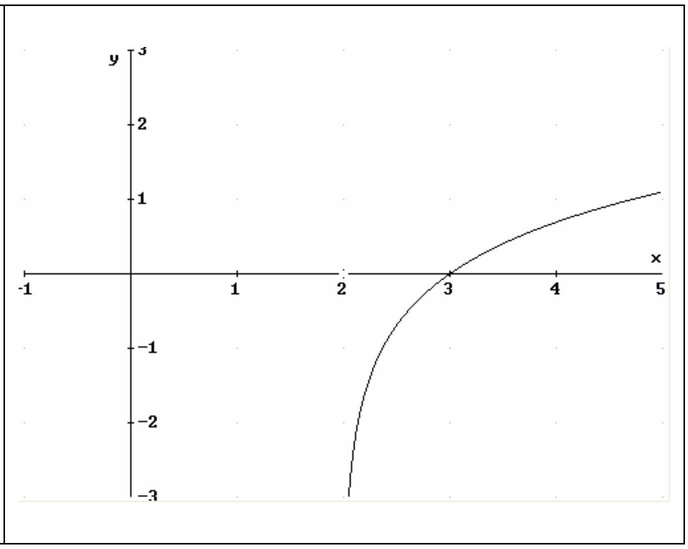


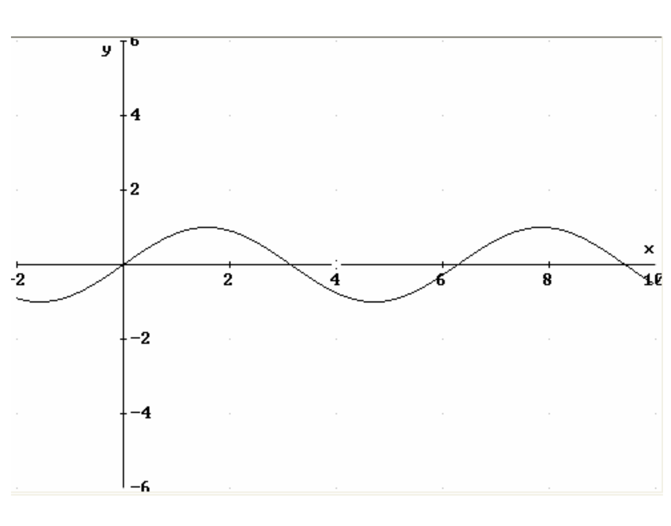
GRAFICO DILATATO (1) $y = f(k \cdot x)$

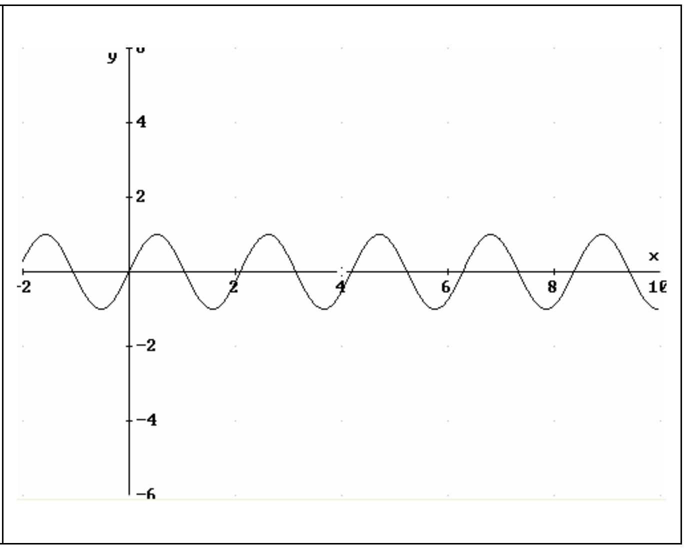
Il grafico della funzione $f(k \cdot x)$ si ottiene dal grafico della funzione $f(x)$:

- contraendolo *(parallelamente all'asse* x*)*, nel rapporto da 1 a $\dfrac{1}{k}$ se $k > 1$
- dilatandolo *(parallelamente all'asse* x*)*, nel rapporto da 1 a $\dfrac{1}{k}$ se $0 < k < 1$

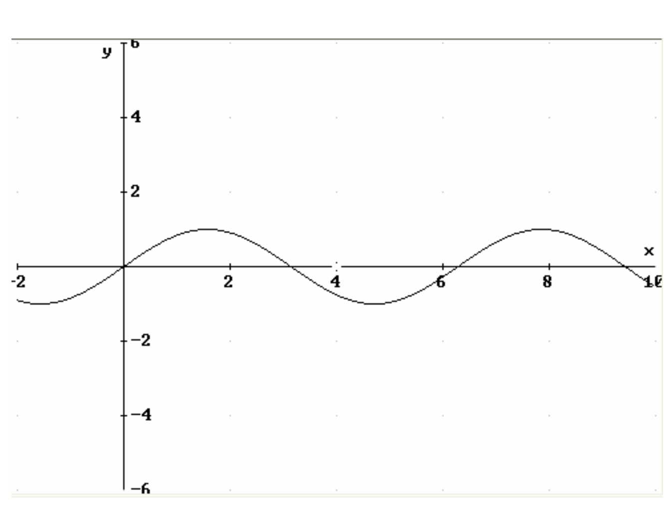
I punti di intersezione con l'asse y restano fissi.

sen x	*sen 3x*





sen x	*sen* $\frac{1}{2}x$



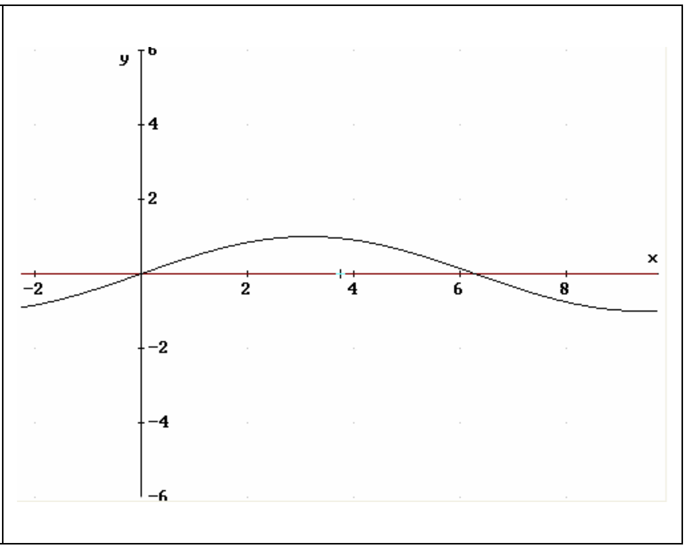
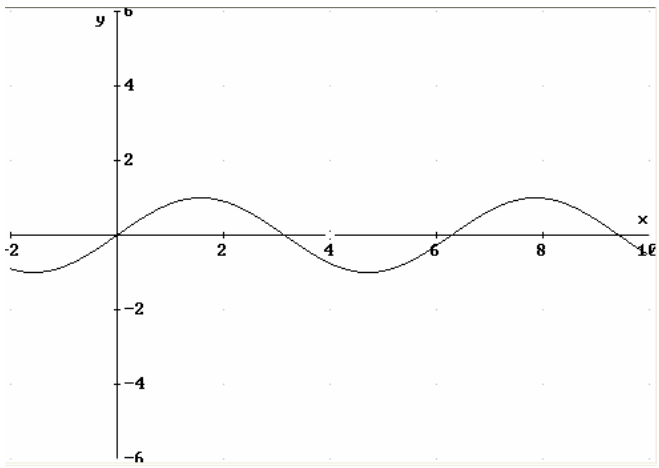


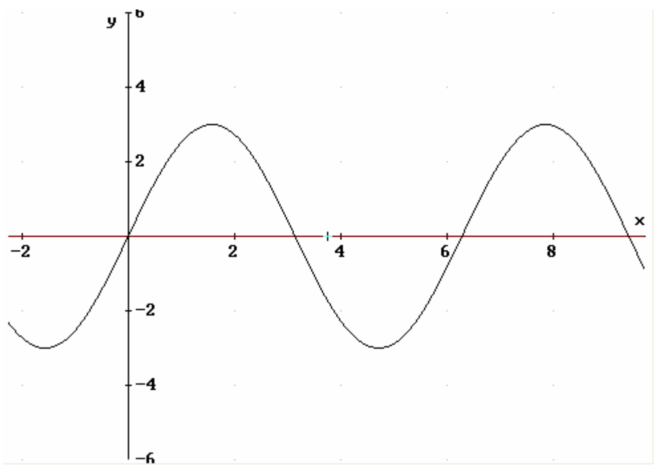
GRAFICO DILATATO (2) $y = k \cdot f(x)$

Il grafico della funzione $k \cdot f(x)$ si ottiene dal grafico della funzione $f(x)$:
- dilatandolo *(parallelamente all'asse y)*, nel rapporto da 1 a k se $k > 1$
- contraendolo *(parallelamente all'asse y)*, nel rapporto da 1 a k se $0 < k < 1$

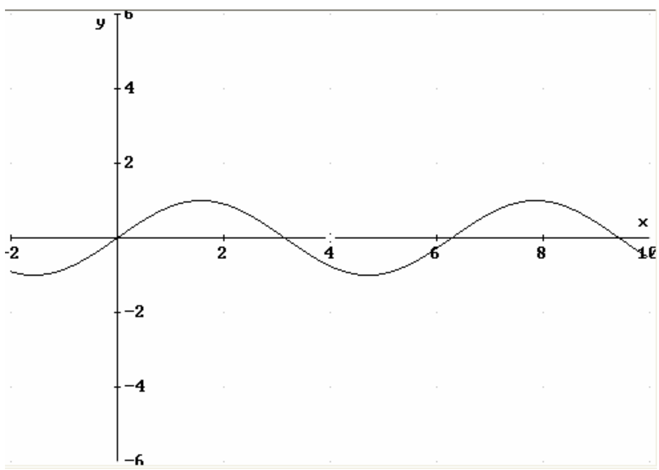
I punti di intersezione con l'asse x restano fissi.

$sen\ x$	$3 \cdot sen\ x$





$sen\ x$	$\frac{1}{2} \cdot sen\ x$



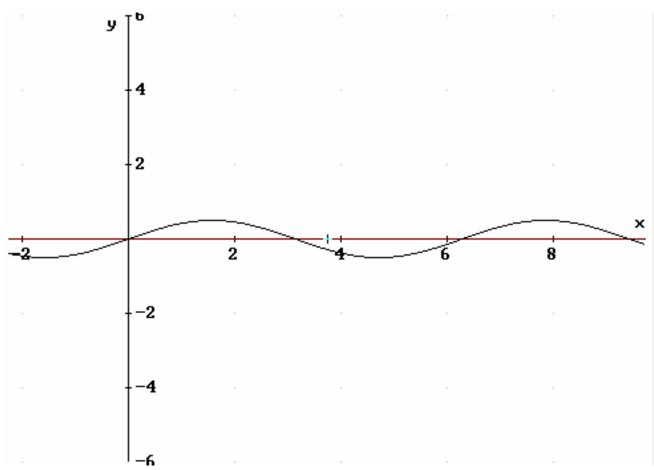
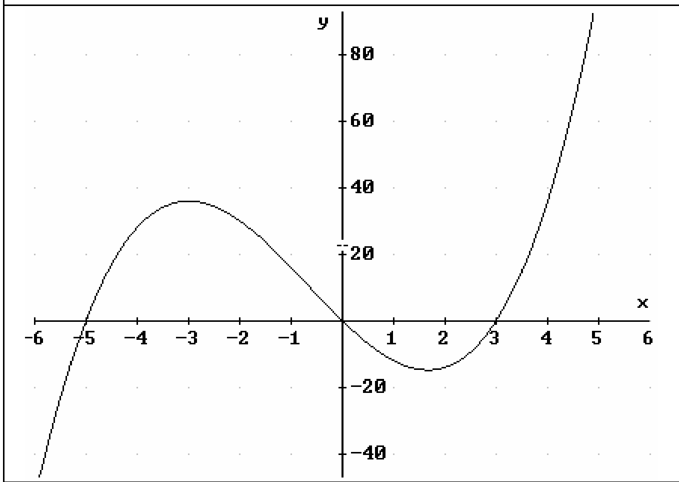
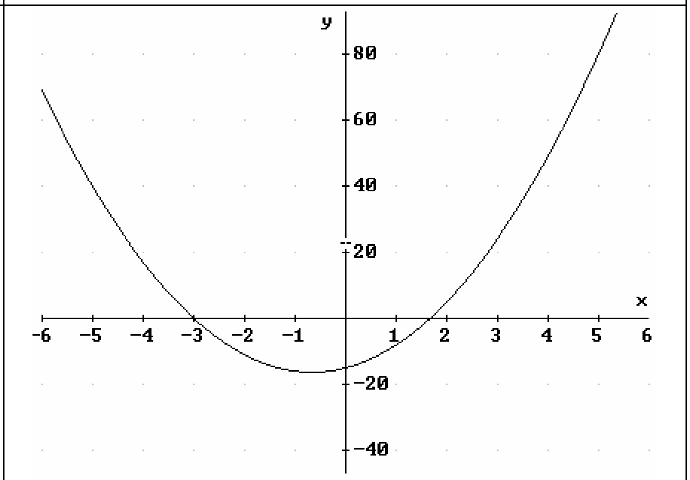
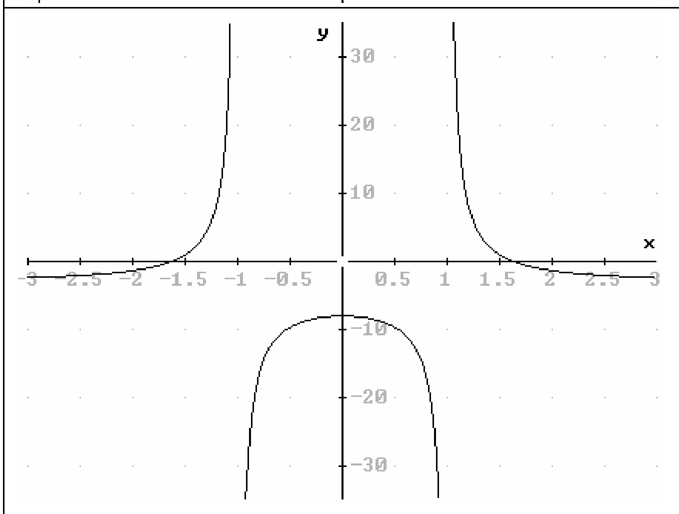
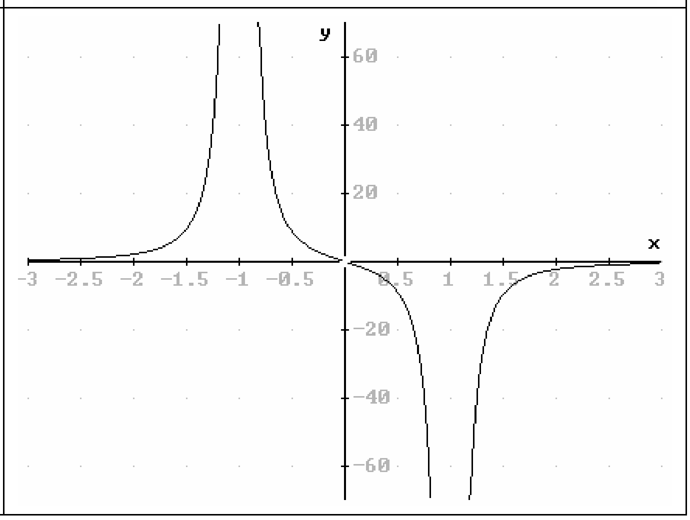


Grafico della funzione derivata $f^I(x)$

Il grafico della derivata $f^I(x)$ si ottiene esaminando alcune caratteristiche della funzione $f(x)$:

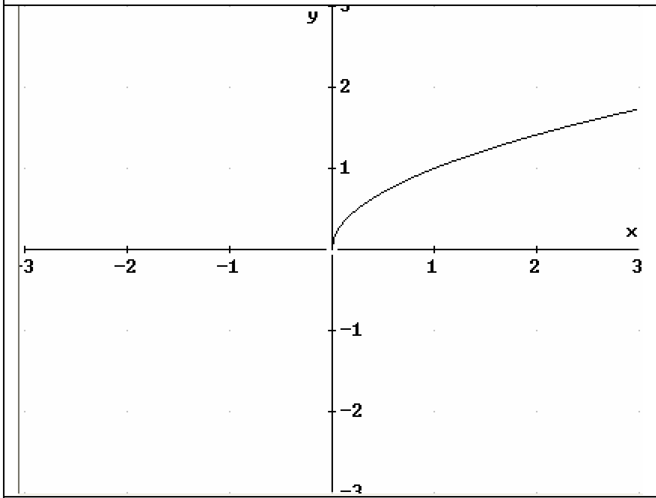
- negli intervalli in cui la funzione $f(x)$ è crescente, la sua derivata $f^I(x)$ è positiva e il valore della derivata sarà tanto maggiore quanto maggiore è la pendenza del grafico della funzione data
- negli intervalli in cui la funzione $f(x)$ è decrescente, la sua derivata $f^I(x)$ è negativa e il valore della derivata sarà tanto maggiore quanto maggiore è la pendenza del grafico della funzione data
- nei punti in cui il grafico della funzione $f(x)$ ha tangente orizzontale (max, min e flessi a tangente orizzontale) la derivata prima $f^I(x)$ tocca l'asse delle x
- negli intervalli in cui il grafico di $f(x)$ volge la concavità verso l'alto, la sua derivata $f^I(x)$ è crescente
- negli intervalli in cui il grafico di $f(x)$ volge la concavità verso il basso, la sua derivata $f^I(x)$ è decrescente
- nei punti di flesso del grafico di $f(x)$, la sua derivata $f^I(x)$ ha un punto di max, o di min o un flesso a tangente orizzontale
- se la funzione $f(x)$ è pari, allora la sua derivata $f^I(x)$ è dispari
- se la funzione $f(x)$ è dispari, allora la sua derivata $f^I(x)$ è pari

$f(x)$	$f^I(x)$
	
	

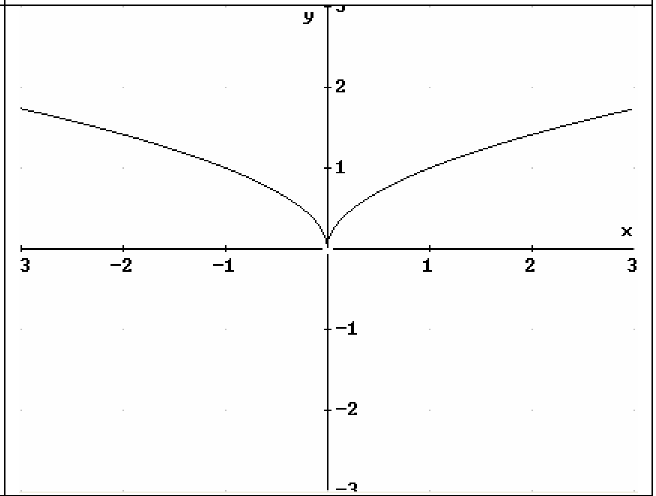
ESEMPI

ESEMPIO 1 : $f(x) = -\dfrac{\sqrt{|x|}}{2}$

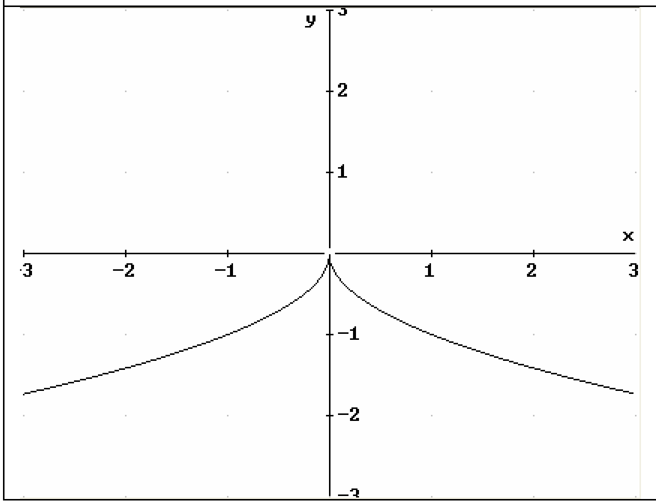
I° Passaggio : $\sqrt{x}$



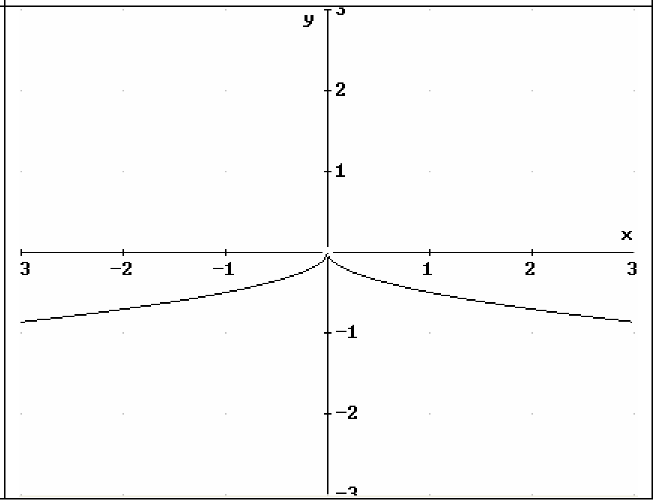
II° Passaggio : $\sqrt{|x|}$



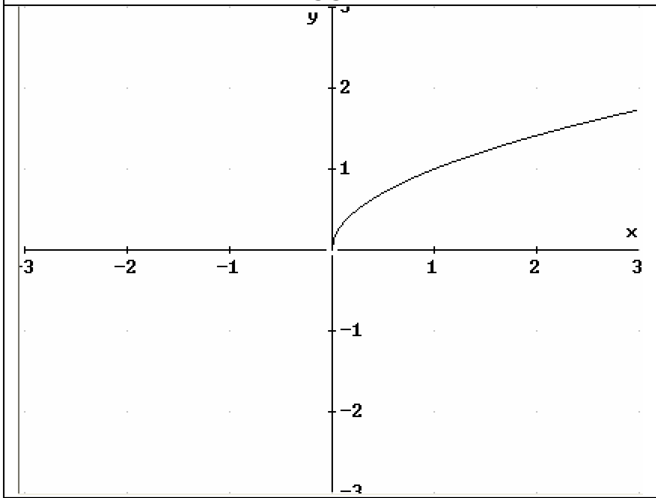
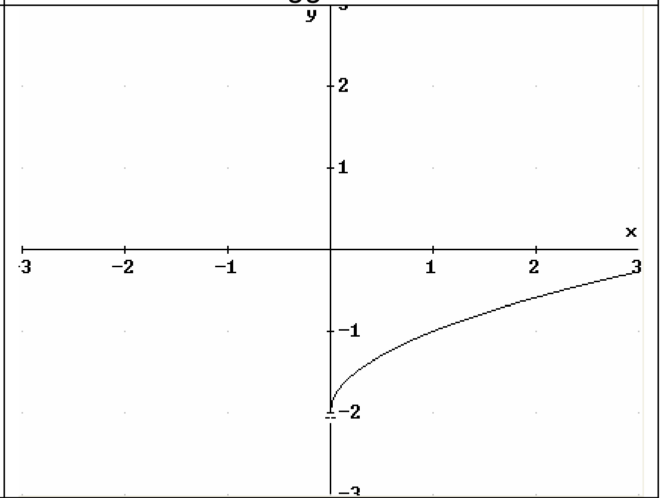
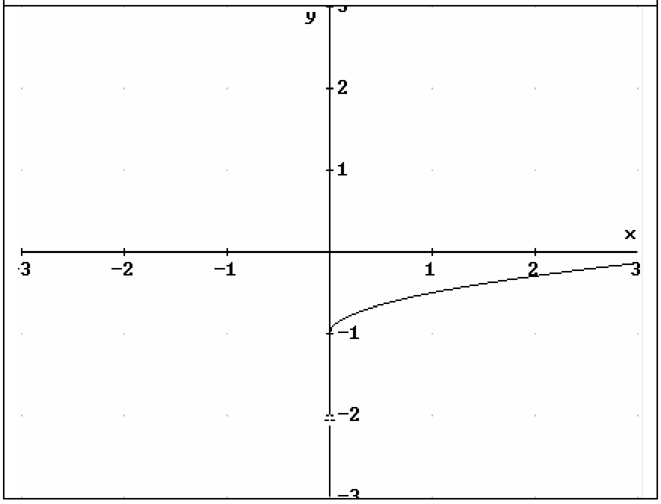
III° Passaggio : $-\sqrt{|x|}$



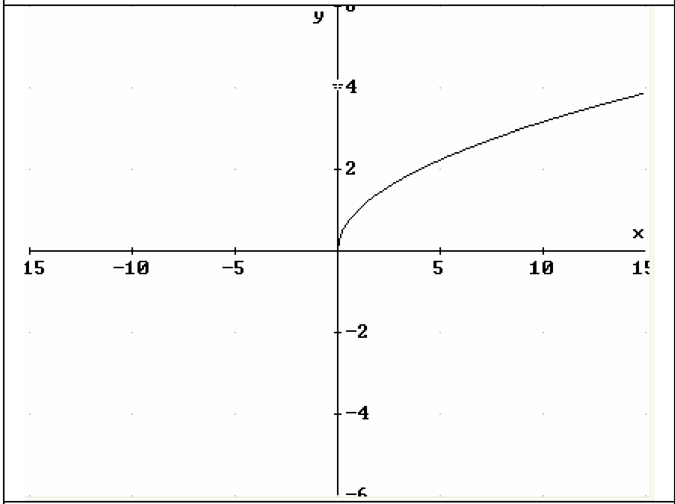
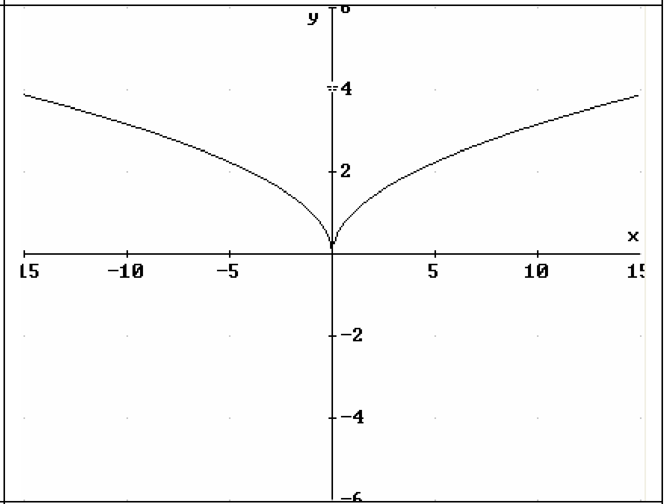
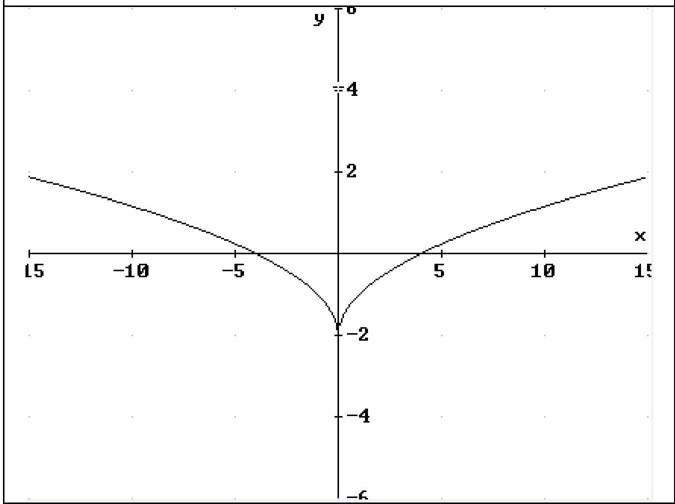
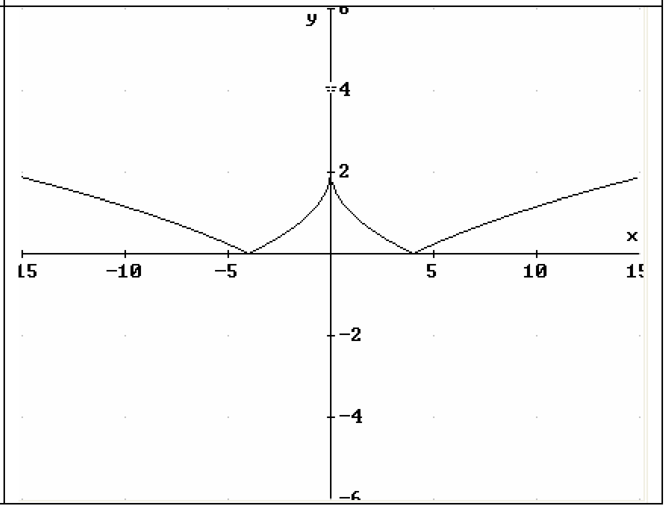
IV° Passaggio : $-\dfrac{\sqrt{|x|}}{2}$



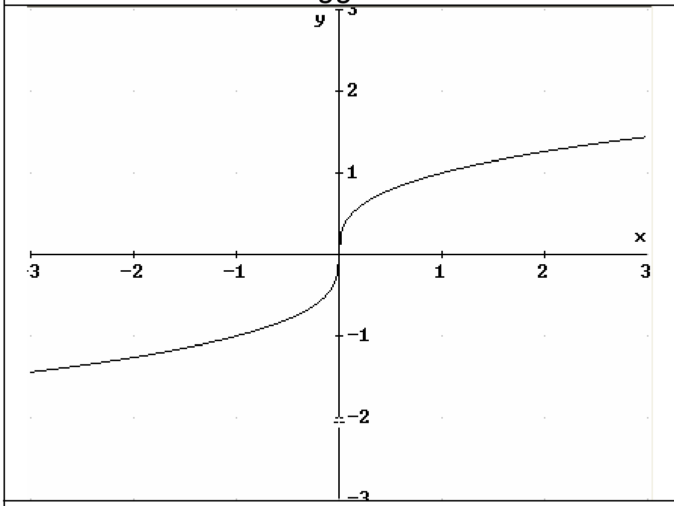
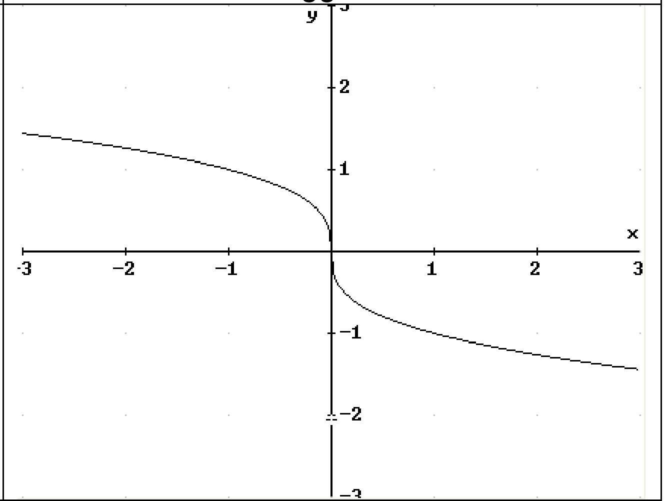
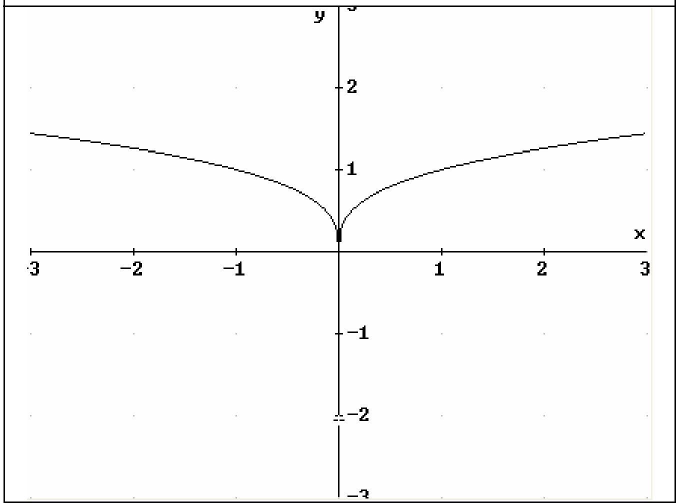
ESEMPIO 2 : $f(x) = \dfrac{\sqrt{x} - 2}{2}$

I° Passaggio : $\sqrt{x}$	*II° Passaggio :* $\sqrt{x} - 2$
	
III° Passaggio : $\dfrac{\sqrt{x} - 2}{2}$	
	

ESEMPIO 3 : $f(x) = \left| \sqrt{|x|} - 2 \right|$

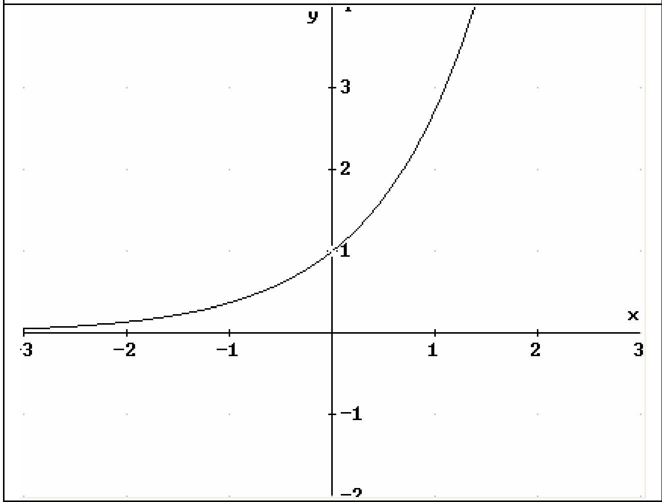
I° Passaggio : $\sqrt{x}$	II° Passaggio : $\sqrt{|x|}$
	
III° Passaggio : $\sqrt{|x|} - 2$	IV° Passaggio : $\left| \sqrt{|x|} - 2 \right|$
	

ESEMPIO 4 : $f(x) = \left| \sqrt[3]{-x} \right|$

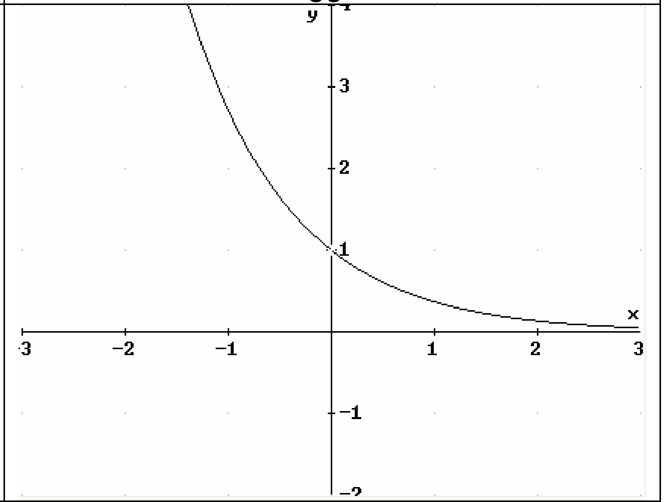
I° Passaggio : $\sqrt[3]{x}$	*II° Passaggio :* $\sqrt[3]{-x}$
	
III° Passaggio : $\left\lvert \sqrt[3]{-x} \right\rvert$	
	

ESEMPIO 5 : $f(x) = e^{-x} + 1$

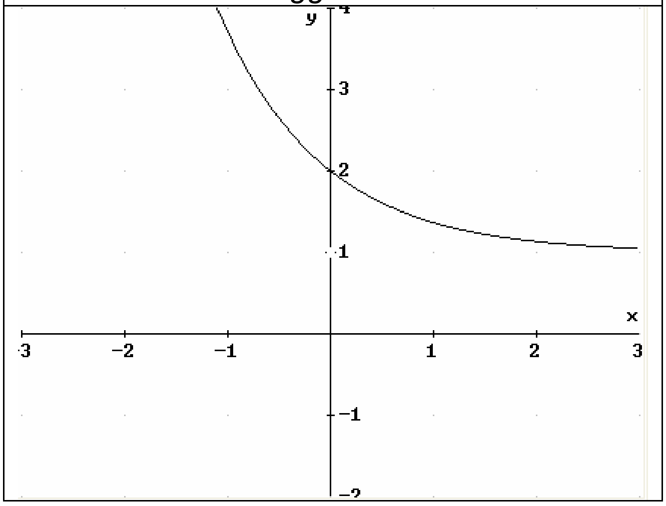
I° Passaggio : e^{x}



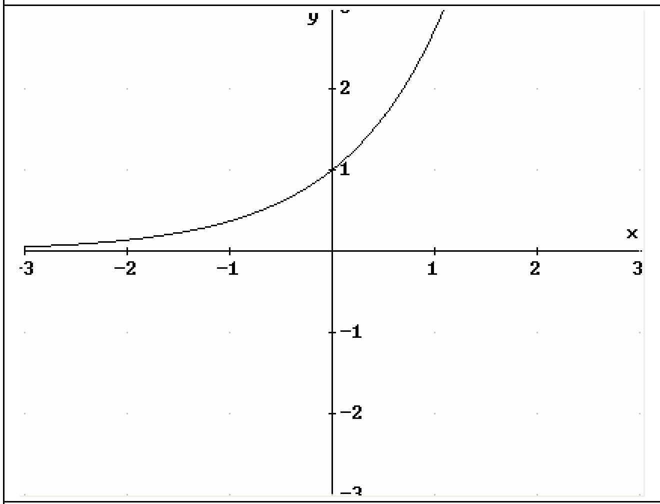
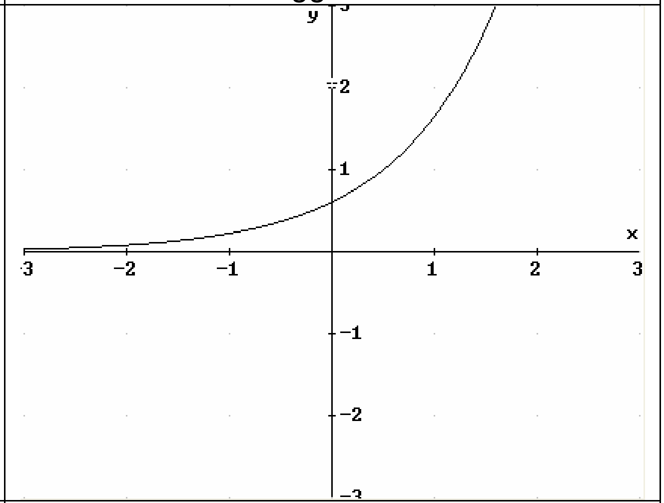
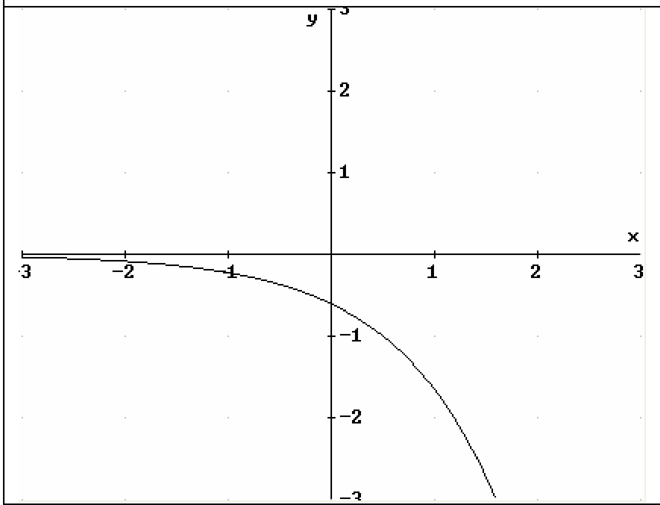
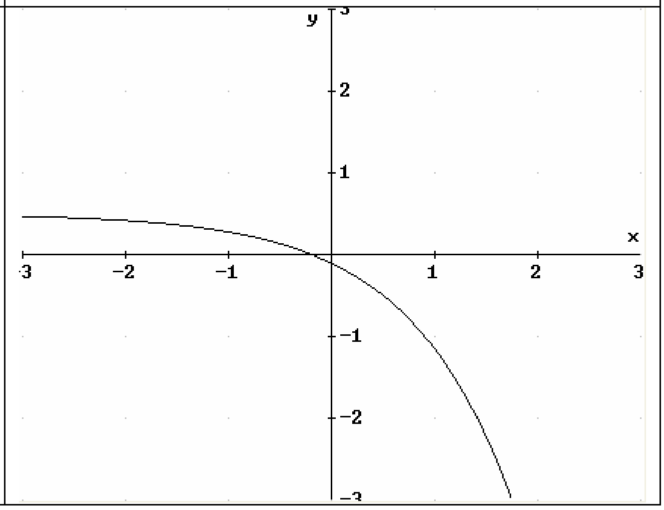
II° Passaggio : e^{-x}



III° Passaggio : $e^{-x} + 1$

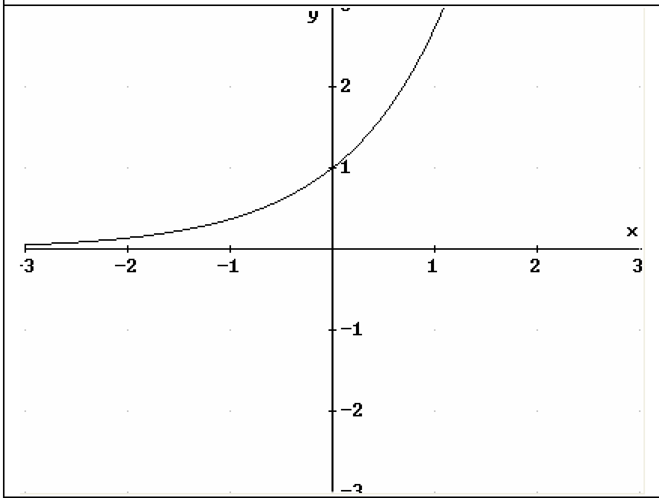


ESEMPIO 6 : $f(x) = -e^{\left(x-\frac{1}{2}\right)} + \frac{1}{2}$

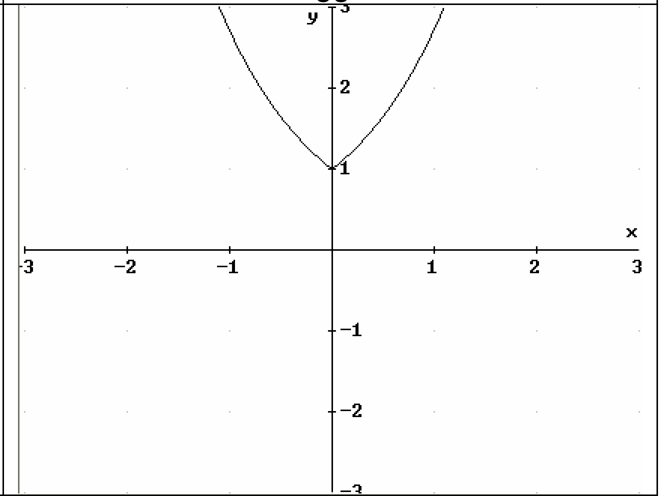
I° Passaggio : e^x	*II° Passaggio :* $e^{\left(x-\frac{1}{2}\right)}$
	
III° Passaggio : $-e^{\left(x-\frac{1}{2}\right)}$	*IV° Passaggio :* $-e^{\left(x-\frac{1}{2}\right)} + \frac{1}{2}$
	

ESEMPIO 7: $f(x) = \left| -e^{|x|} + 1 \right|$

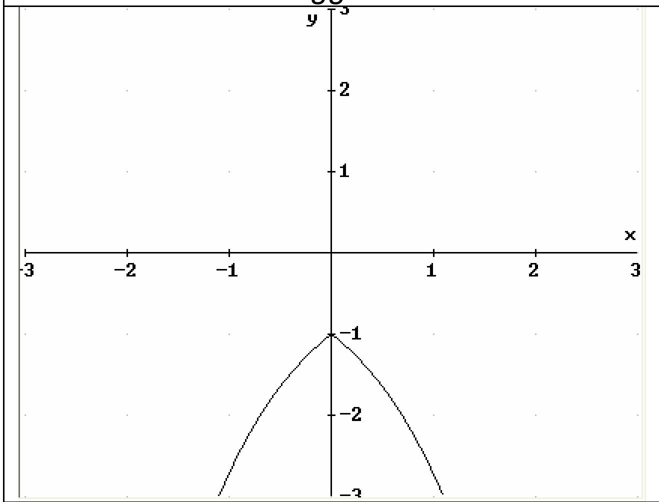
I° Passaggio : e^{x}



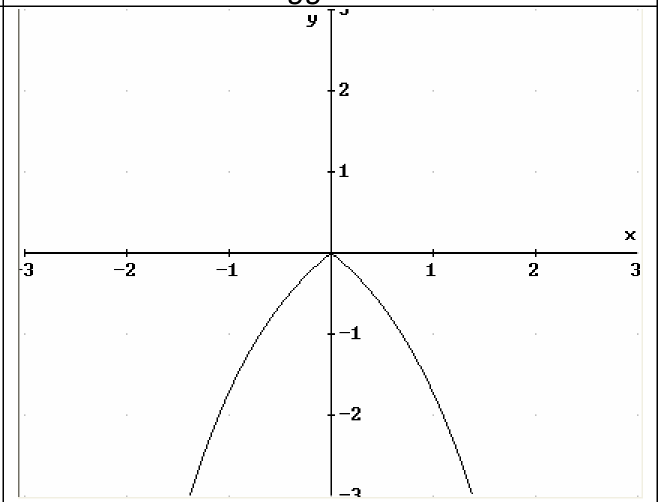
II° Passaggio : $e^{|x|}$



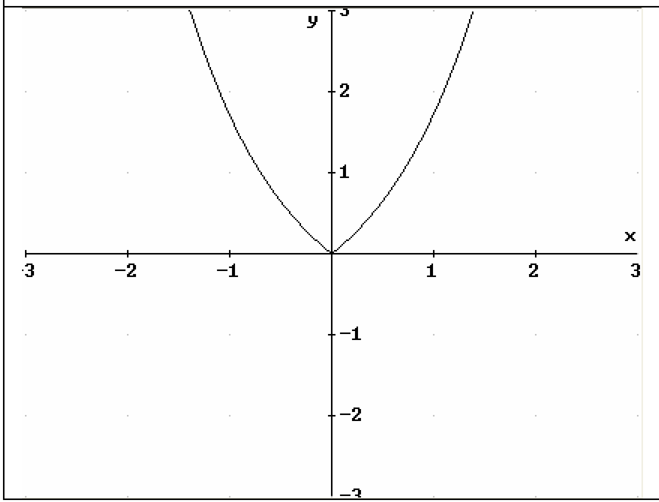
III° Passaggio : $-e^{|x|}$



IV° Passaggio : $-e^{|x|}+1$

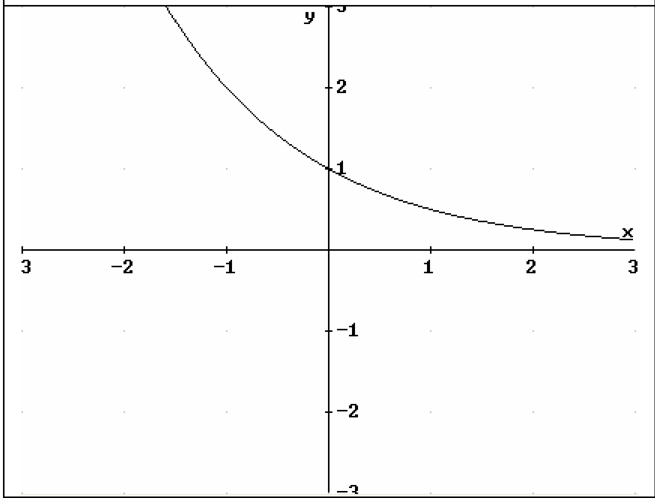


V° Passaggio : $\left| -e^{|x|}+1 \right|$

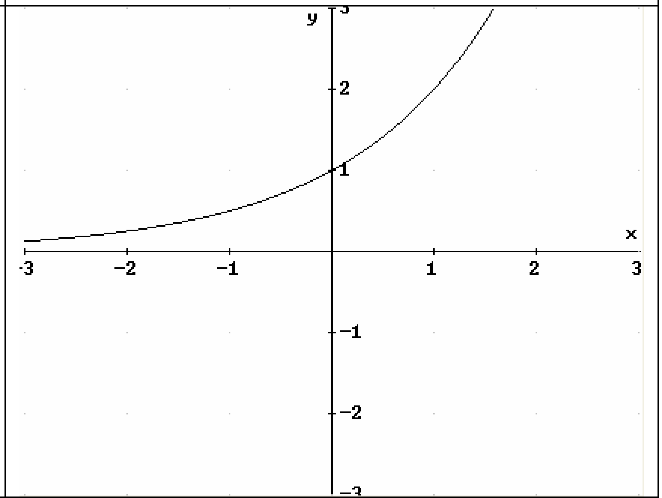


ESEMPIO 8 : $f(x)=\left(\frac{1}{2}\right)^{-x}-1$

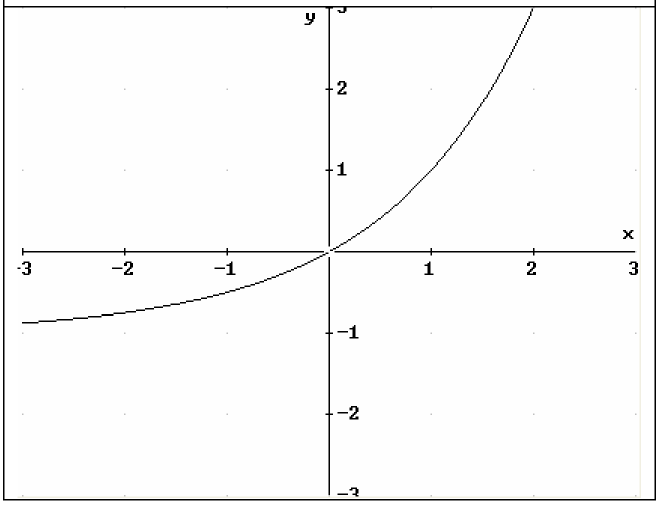
I° Passaggio : $\left(\frac{1}{2}\right)^{x}$



II° Passaggio : $\left(\frac{1}{2}\right)^{-x}$

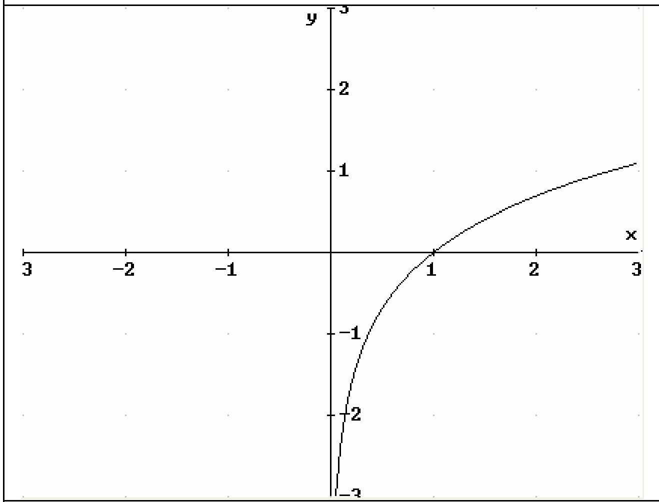


III° Passaggio : $\left(\frac{1}{2}\right)^{-x}-1$

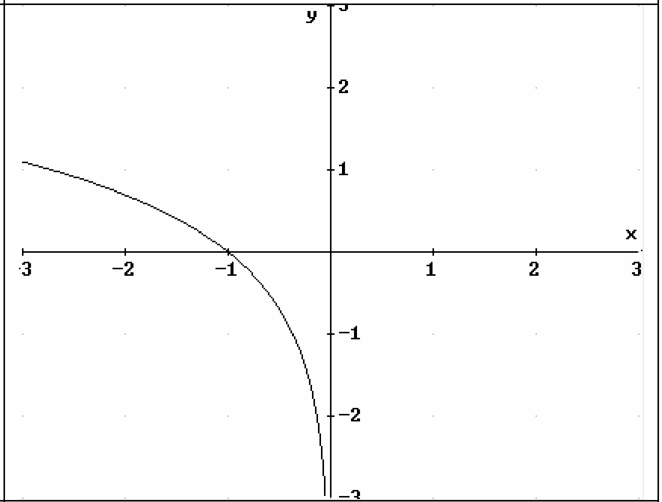


ESEMPIO 9 : $f(x) = -\left| \log(-x) \right|$

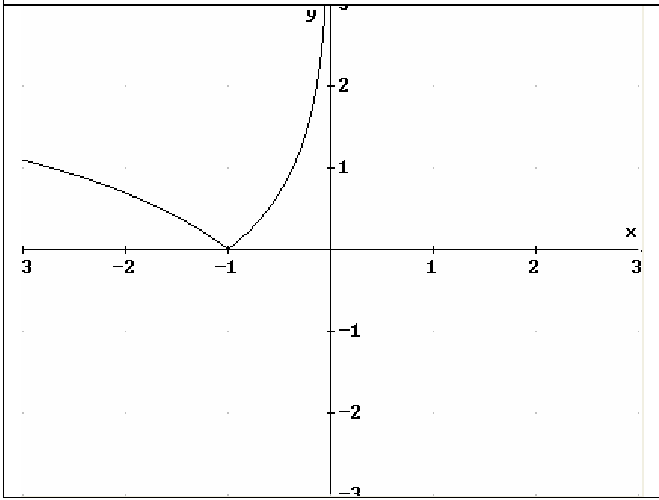
I° Passaggio : $\log x$



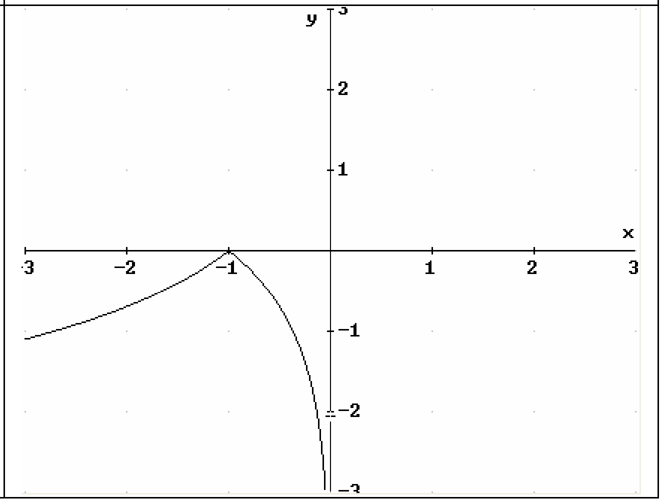
II° Passaggio : $\log(-x)$



III° Passaggio : $\left| \log(-x) \right|$

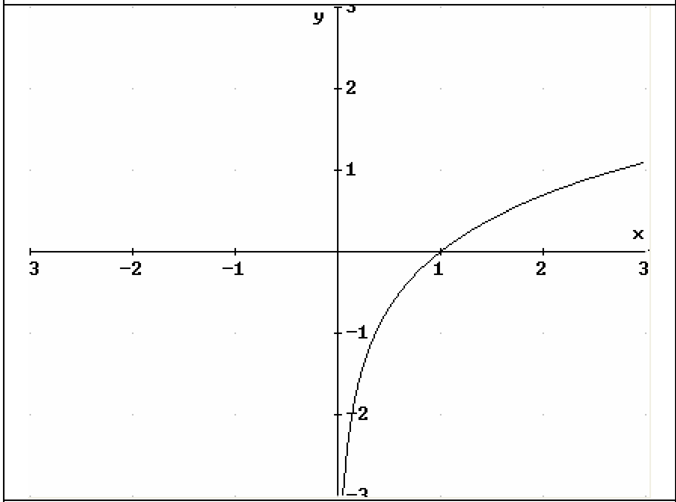


IV° Passaggio : $-\left| \log(-x) \right|$

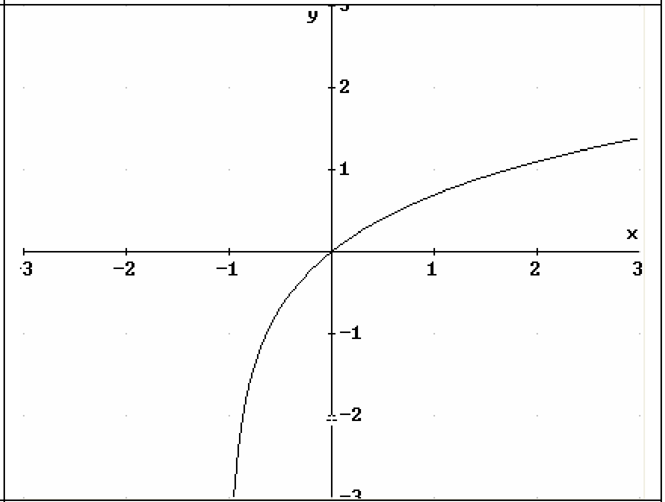


ESEMPIO 10 : $f(x) = 1 - \log|x+1|$

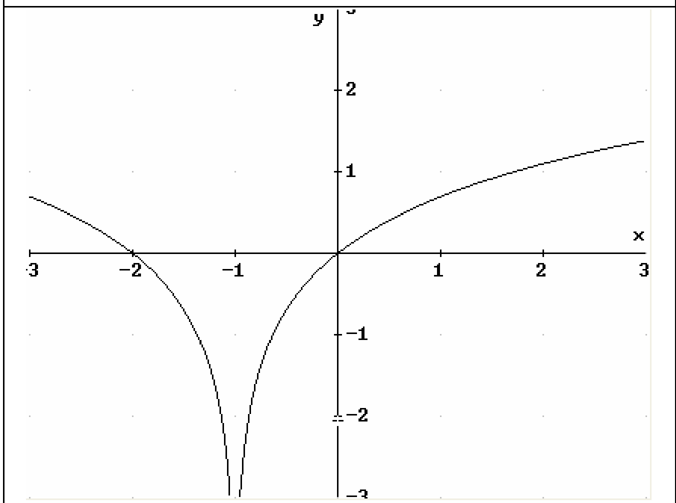
I° Passaggio : $\log x$



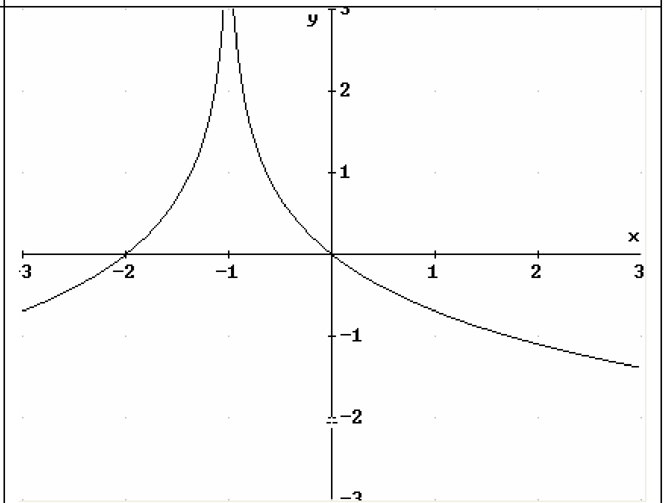
II° Passaggio : $\log(x+1)$



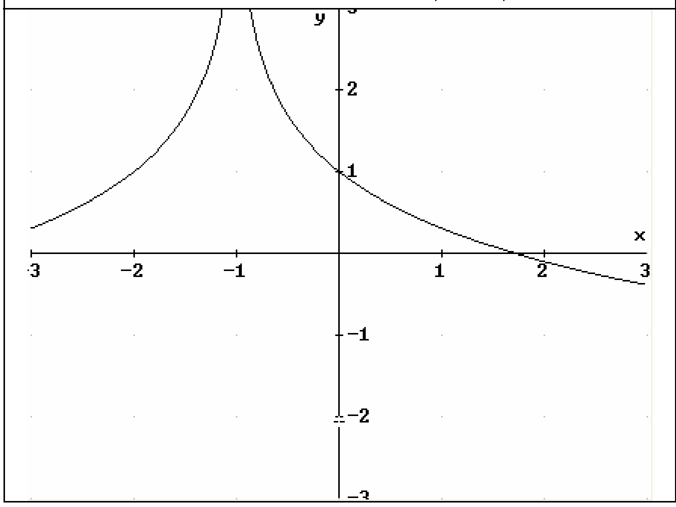
III° Passaggio : $\log|x+1|$



IV° Passaggio : $-\log|x+1|$

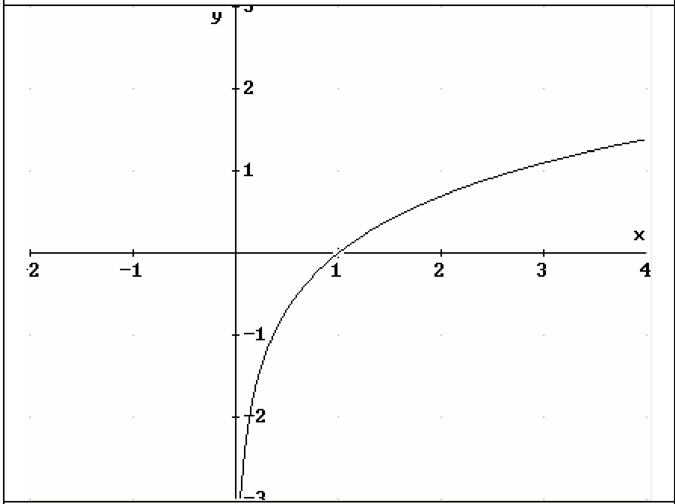


V° Passaggio : $-\log|x+1|+1$

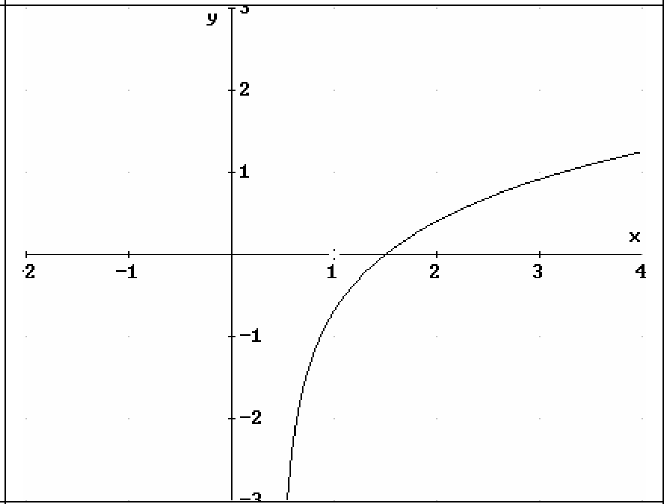


ESEMPIO 11 : $f(x)=\frac{1}{2}-\log\left(x-\frac{1}{2}\right)$

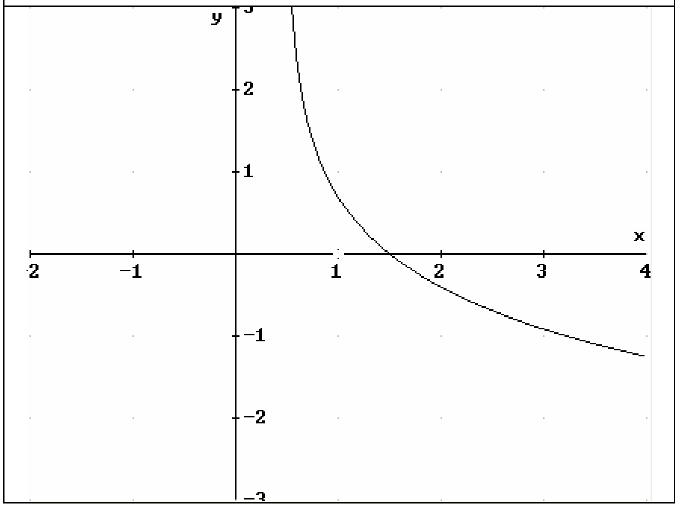
I° Passaggio : $\log x$



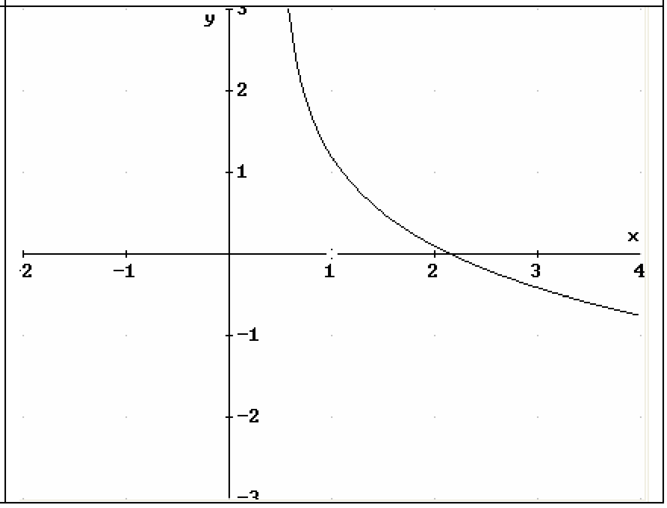
II° Passaggio : $\log\left(x-\frac{1}{2}\right)$



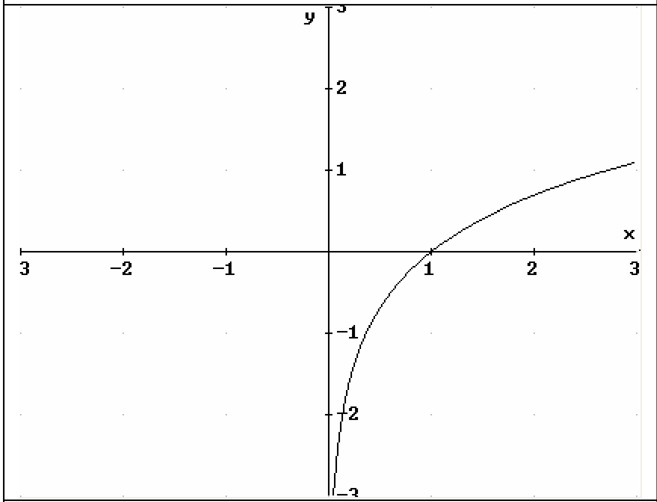
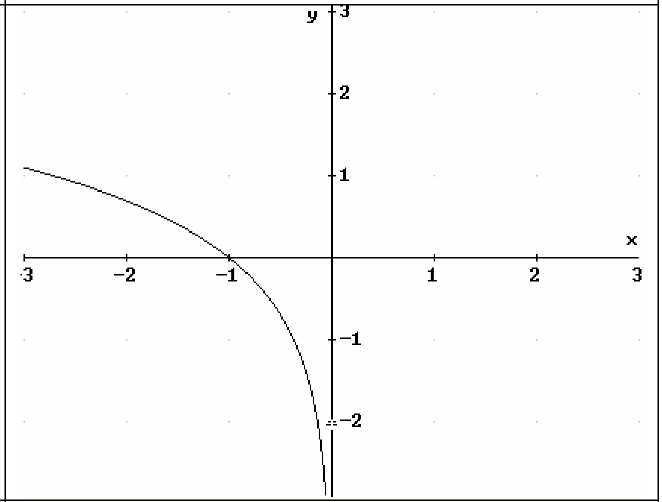
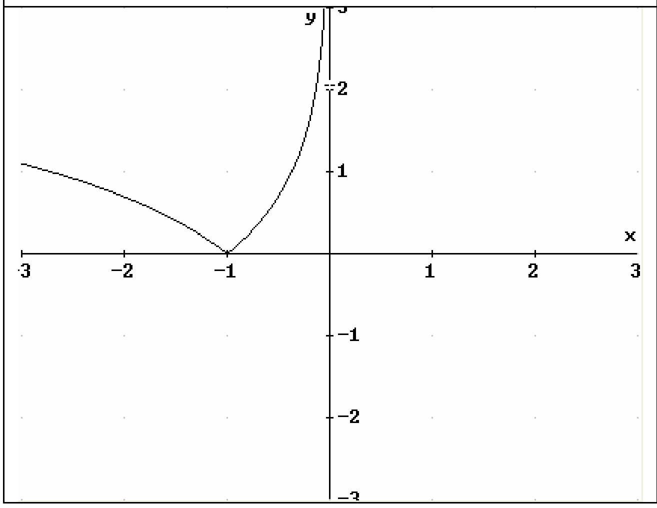
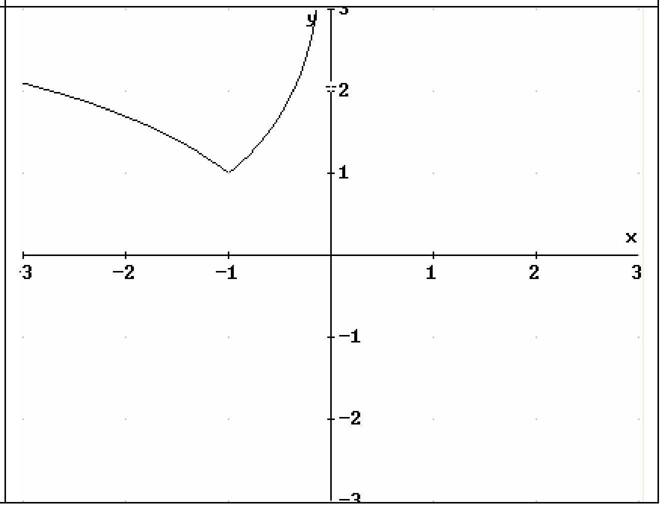
III° Passaggio : $-\log\left(x-\frac{1}{2}\right)$



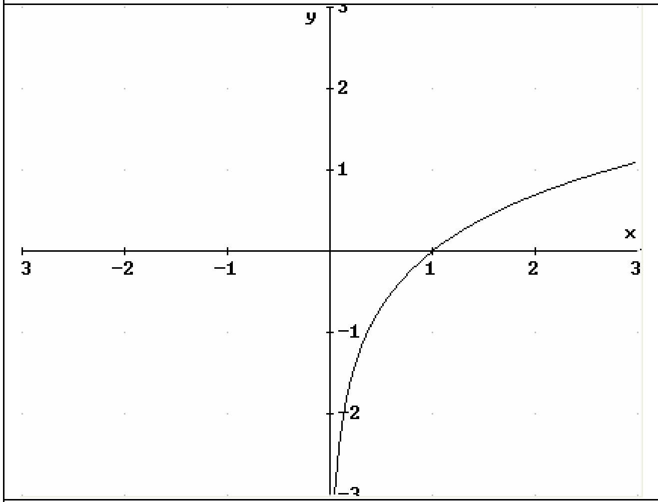
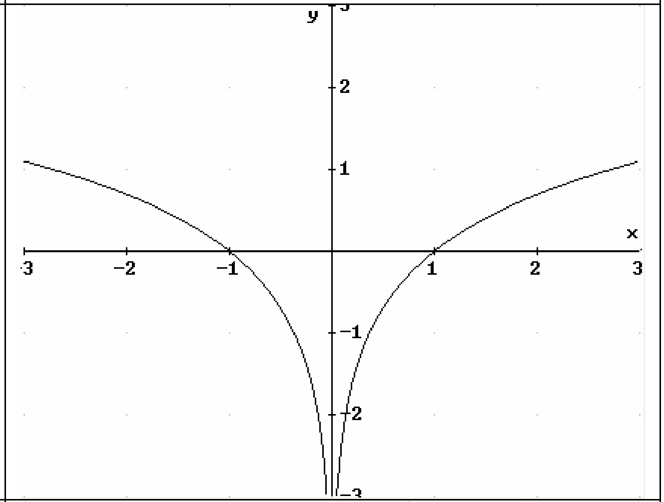
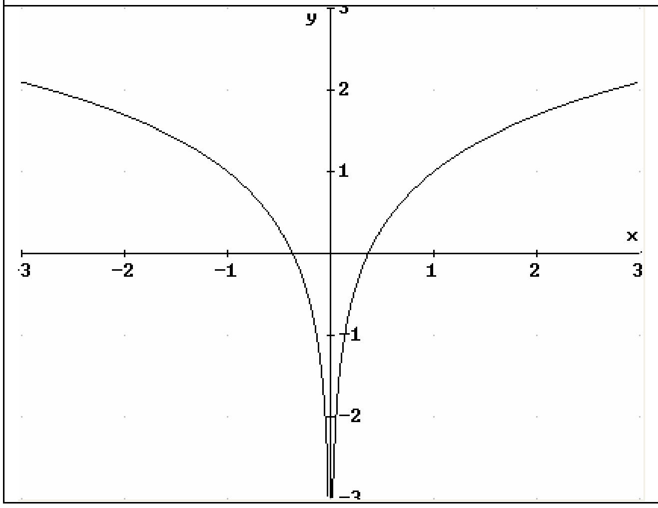
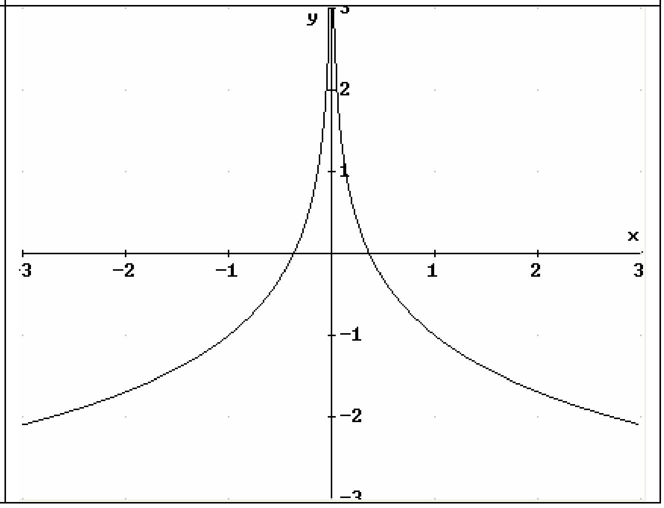
IV° Passaggio : $-\log\left(x-\frac{1}{2}\right)+\frac{1}{2}$



ESEMPIO 12 : $f(x) = |log(-x)| + 1$

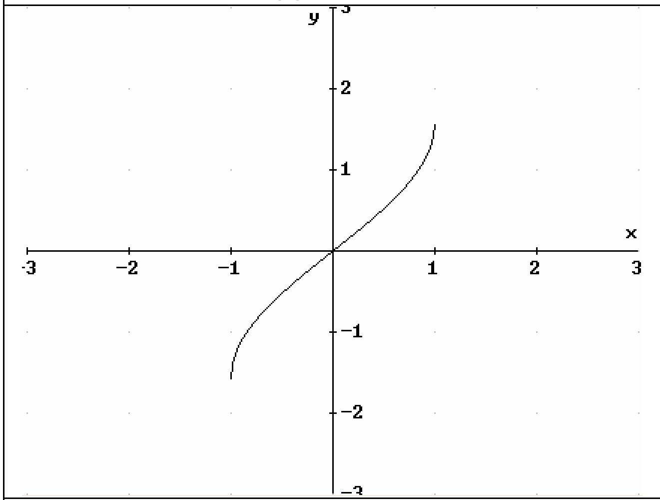
I° Passaggio : $\log x$	*II° Passaggio :* $\log(-x)$
	
III° Passaggio : $\lvert log(-x)\rvert$	*IV° Passaggio :* $\lvert log(-x)\rvert + 1$
	

ESEMPIO 13 : $f(x) = -\left(1 + log\left|x\right|\right)$

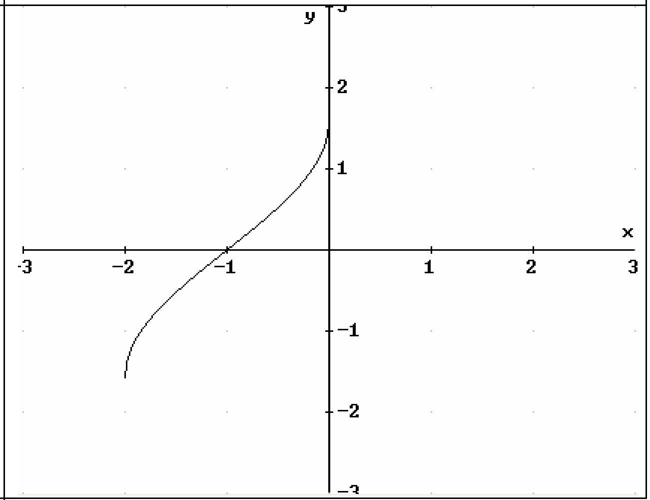
I° Passaggio : $log\ x$	*II° Passaggio :* $log\left\|x\right\|$
	
III° Passaggio : $1 + log\left\|x\right\|$	*IV° Passaggio :* $-\left(1 + log\left\|x\right\|\right)$
	

ESEMPIO 14 : $f(x) = 2 \cdot arcsen\,(x+1)$

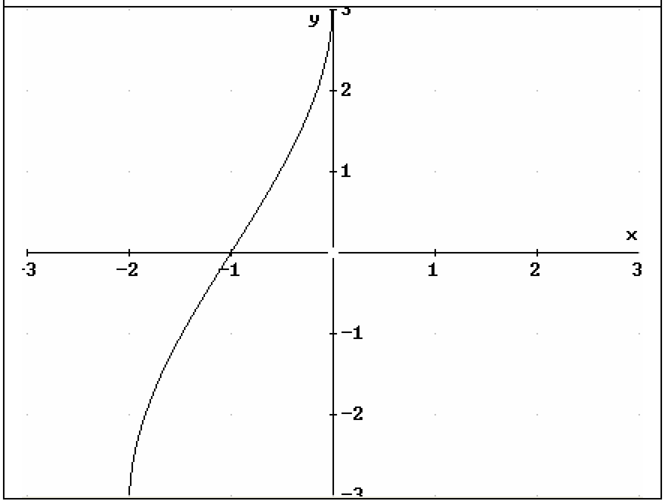
I° Passaggio : $arcsen\,x$



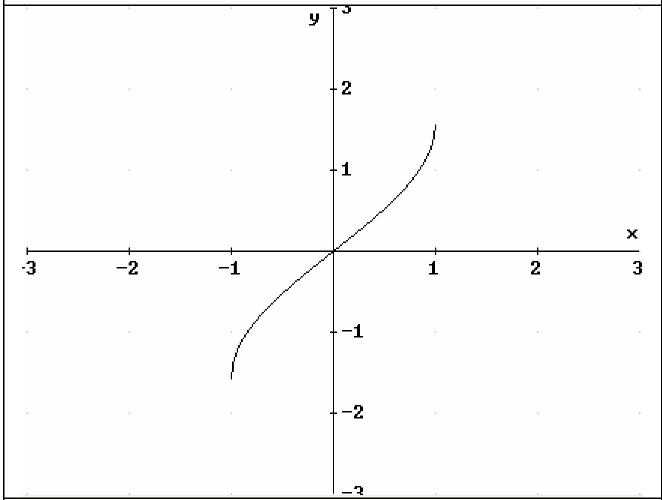
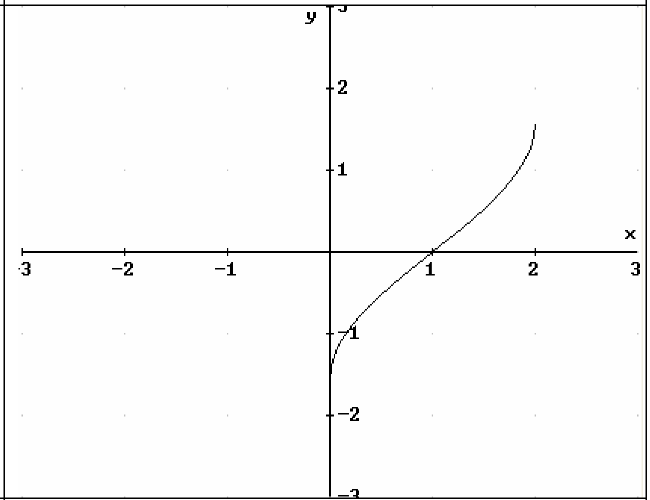
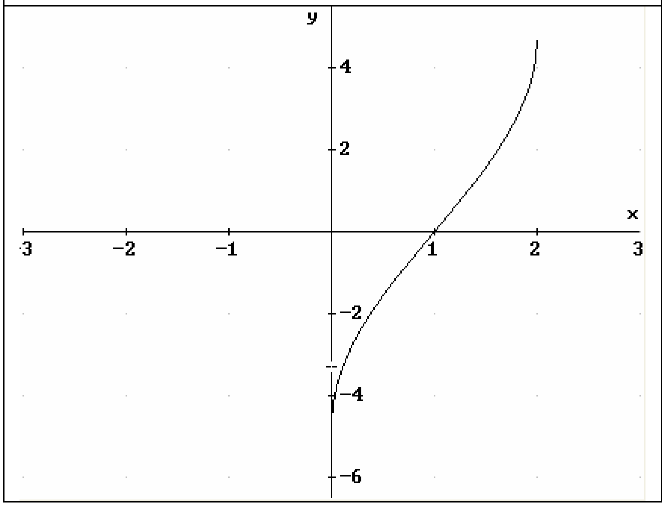
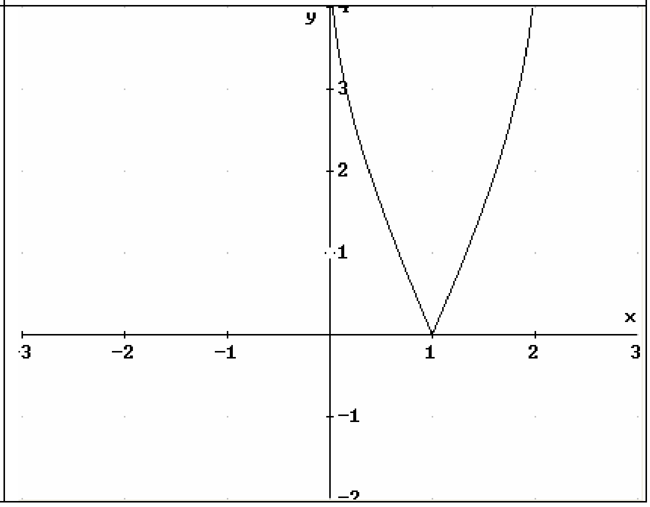
II° Passaggio : $arcsen\,(x+1)$



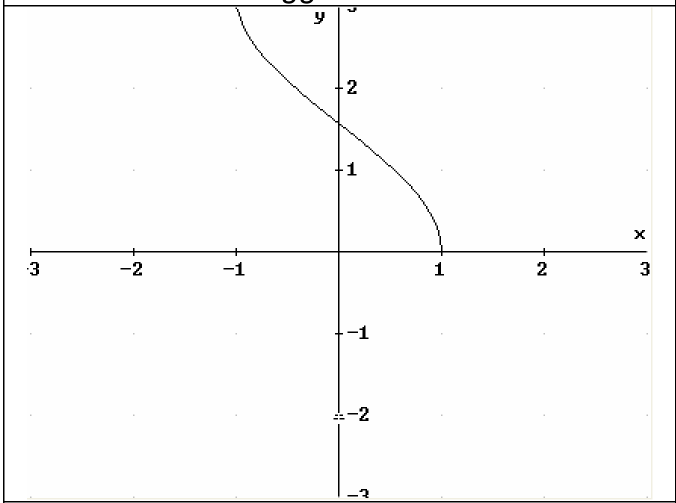
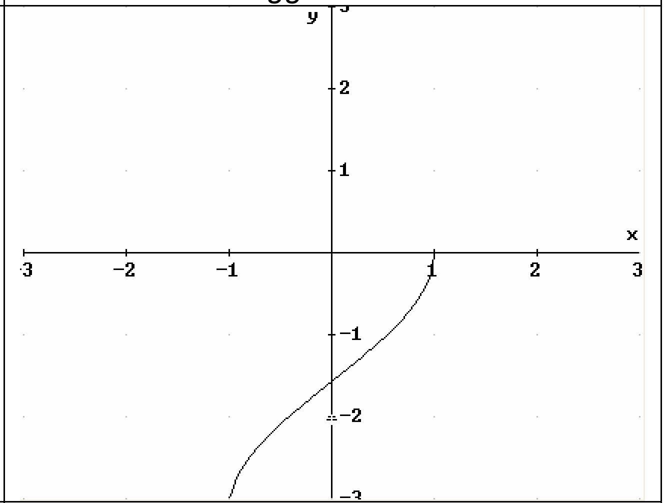
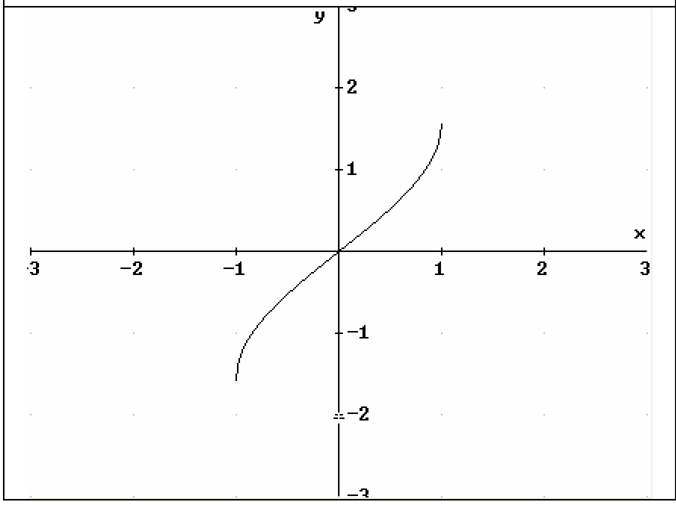
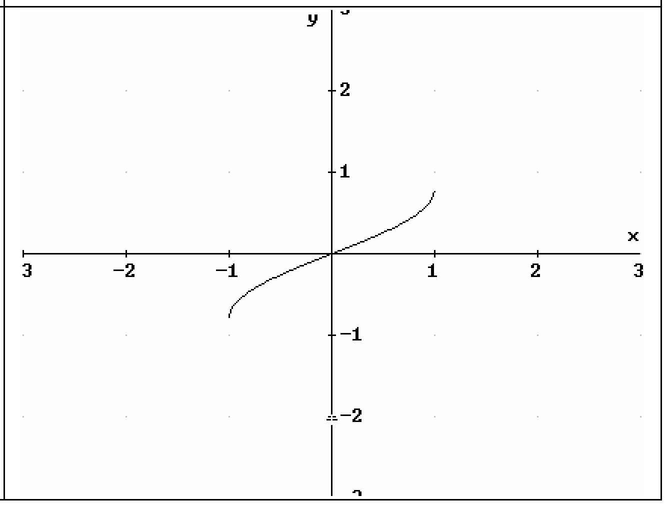
III° Passaggio : $2 \cdot arcsen\,(x+1)$



ESEMPIO 15 : $f(x) = \left| 3 \cdot arcsen\,(x-1) \right|$

I° Passaggio : $arcsen\ x$	*II° Passaggio :* $arcsen\,(x-1)$
	
III° Passaggio : $3 \cdot arcsen\,(x-1)$	*IV° Passaggio :* $\left| 3 \cdot arcsen\,(x-1) \right|$
	

ESEMPIO 16 : $f(x) = \dfrac{-\arccos x + \pi/2}{2}$

<table>
<tr><td>I° Passaggio : $\arccos x$</td><td>II° Passaggio : $-\arccos x$</td></tr>
<tr><td></td><td></td></tr>
<tr><td>III° Passaggio : $-\arccos x + \pi/2$</td><td>IV° Passaggio : $\dfrac{-\arccos x + \pi/2}{2}$</td></tr>
<tr><td></td><td></td></tr>
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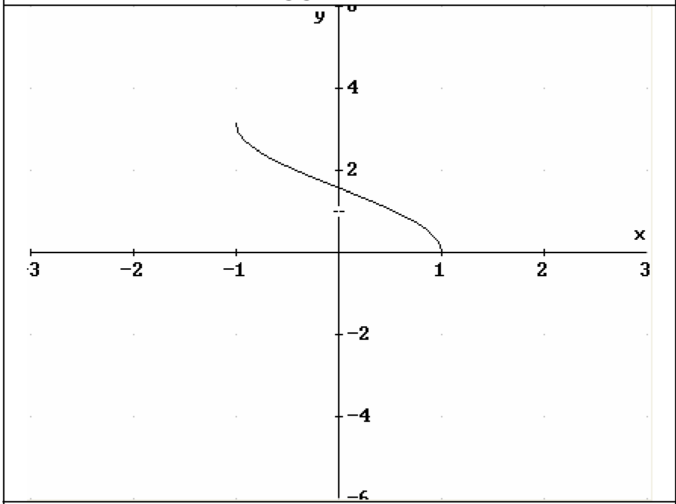
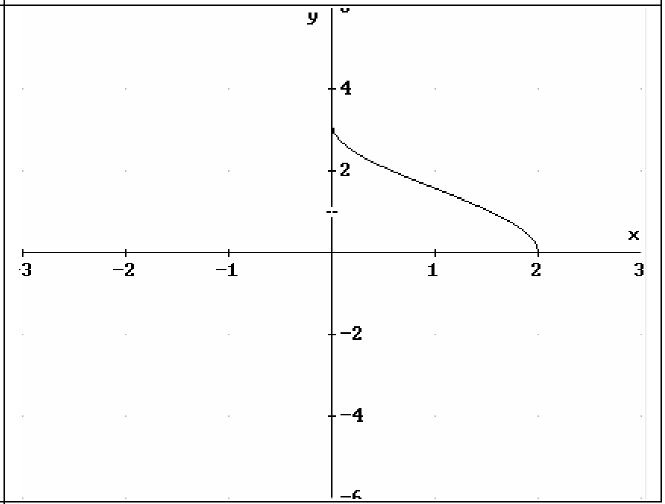
ESEMPIO 17 : $f(x) = 3 \cdot arccos(x - 1)$

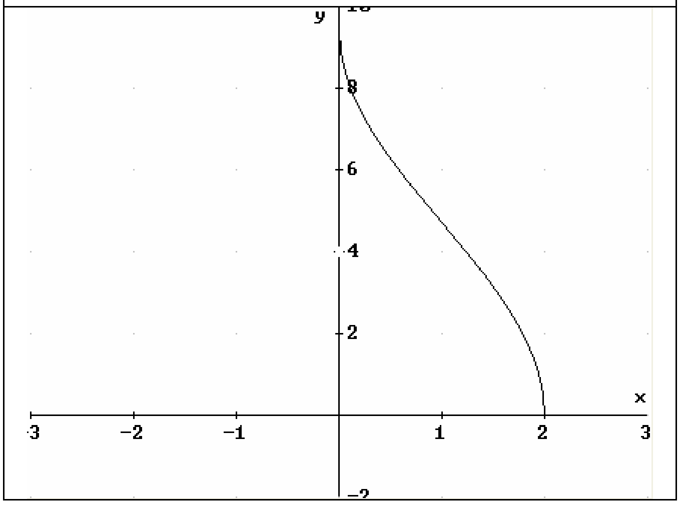
I° Passaggio : $arccos\ x$



II° Passaggio : $arccos(x - 1)$

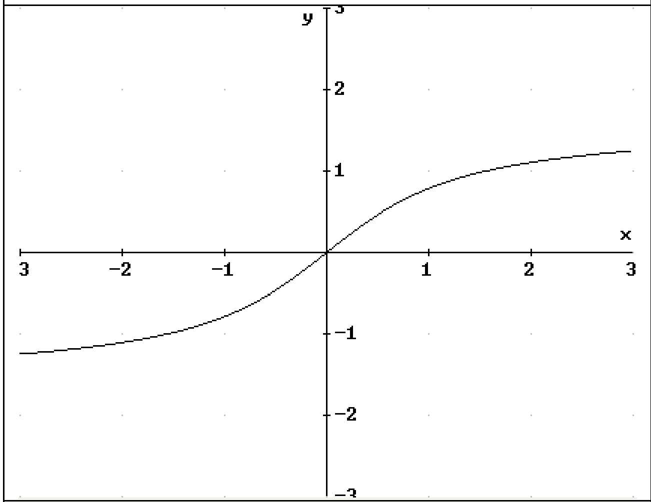


III° Passaggio : $3 \cdot arccos(x - 1)$

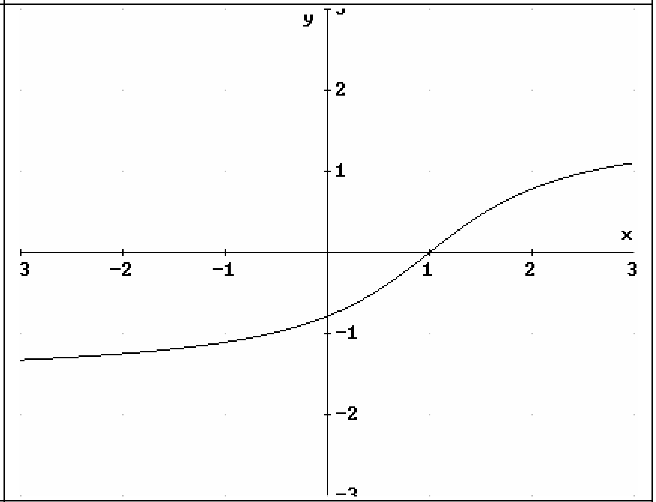


ESEMPIO 18 : $f(x) = \frac{\pi}{2} - \left| arctg\,(x-1) \right|$

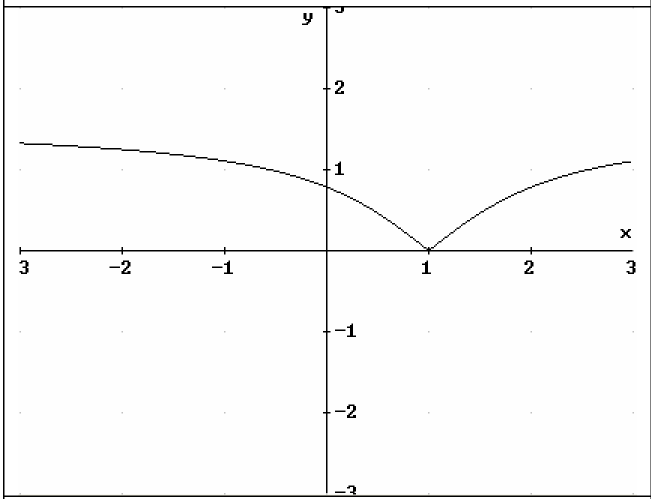
I° Passaggio : $arctg\ x$



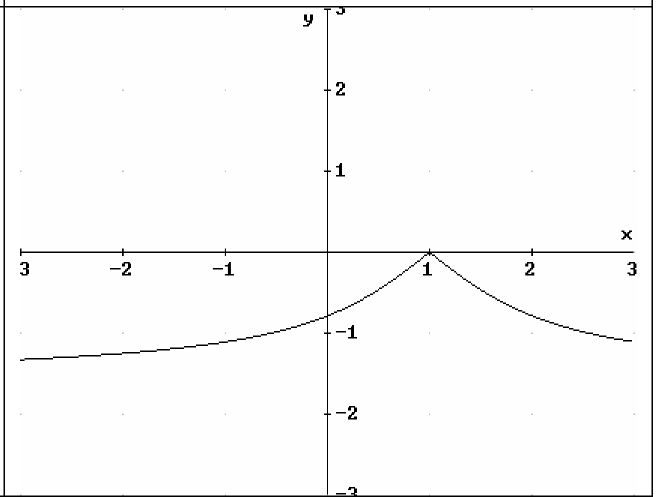
II° Passaggio : $arctg\,(x-1)$



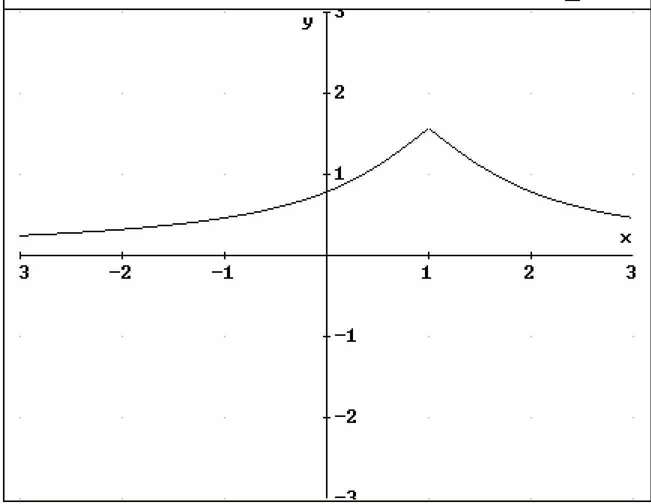
III° Passaggio : $\left| arctg\,(x-1) \right|$



IV° Passaggio : $-\left| arctg\,(x-1) \right|$

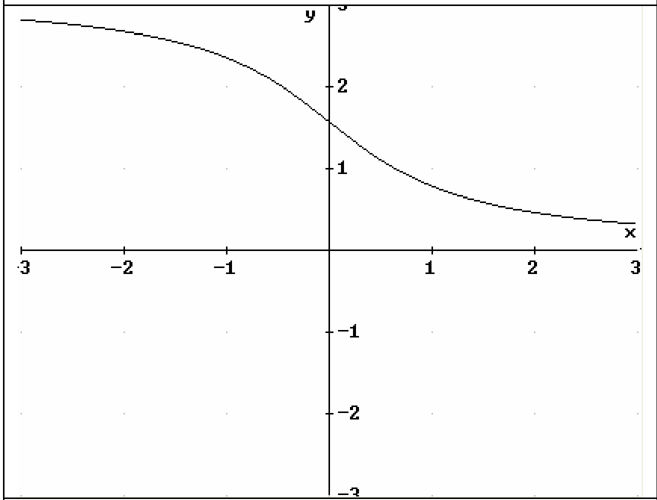


V° Passaggio : $-\left| arctg\,(x-1) \right| + \frac{\pi}{2}$

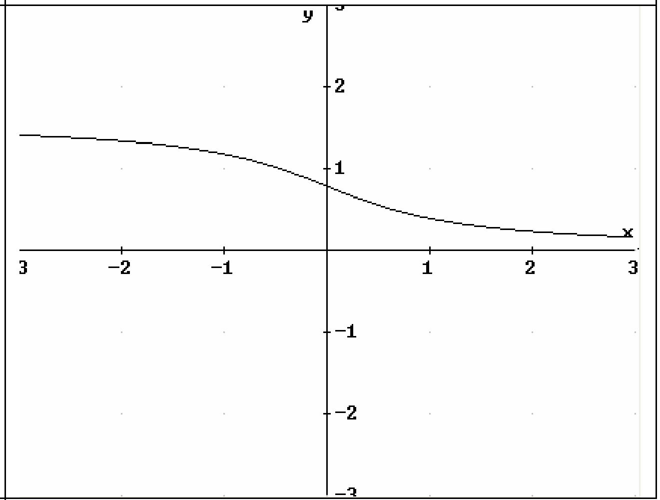


ESEMPIO 19 : $f(x) = \frac{1}{2} \cdot arccotg\ x - \frac{\pi}{2}$

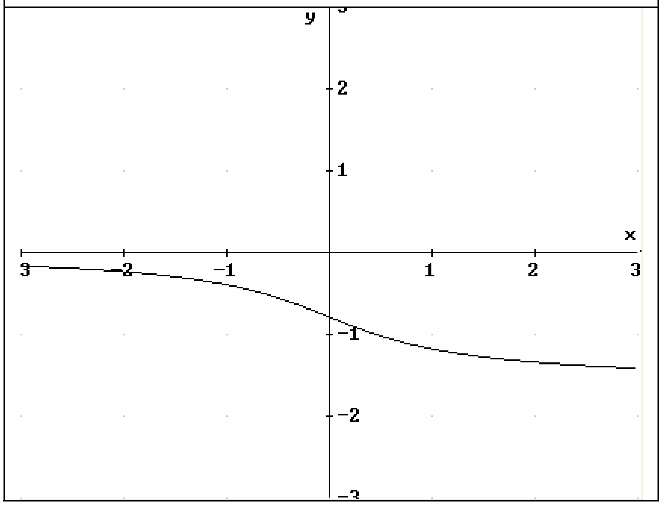
I° Passaggio : $arccotg\ x$



II° Passaggio : $\frac{1}{2} \cdot arccotg\ x$

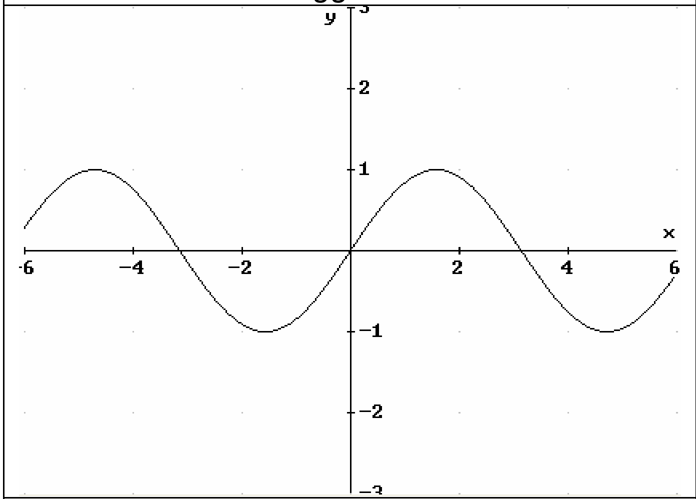


III° Passaggio : $\frac{1}{2} \cdot arccotg\ x - \frac{\pi}{2}$

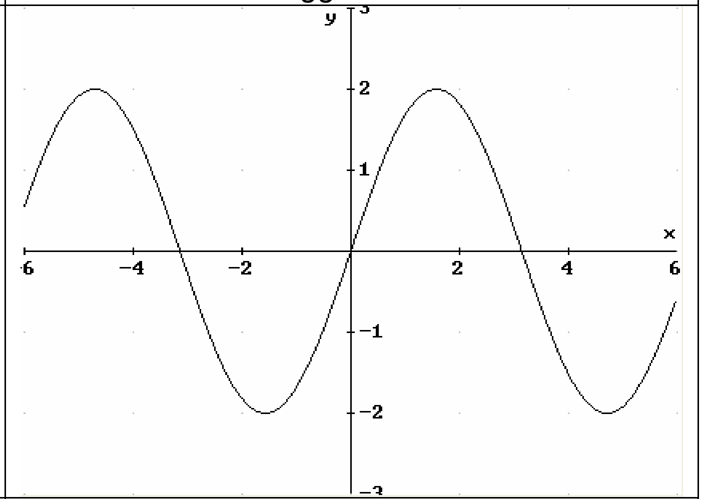


ESEMPIO 20 : $f(x) = 2 \cdot sen\ x - cos\ x$

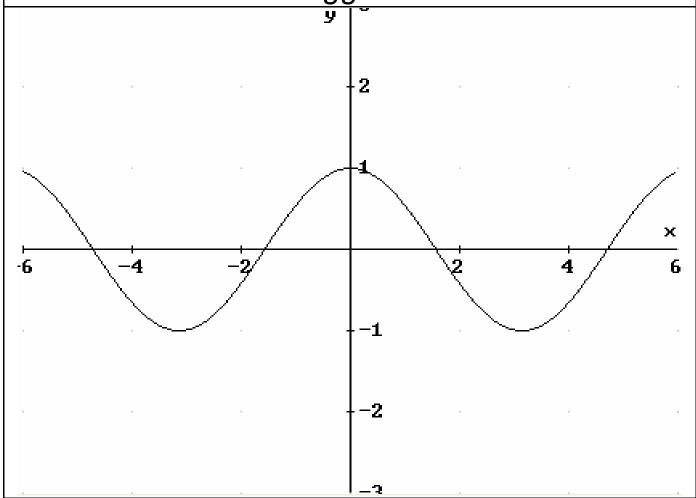
I° Passaggio : $sen\ x$



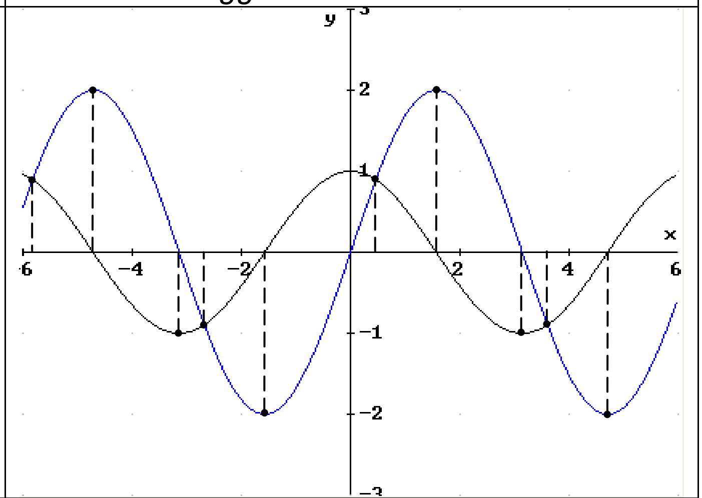
II° Passaggio : $2 \cdot sen\ x$



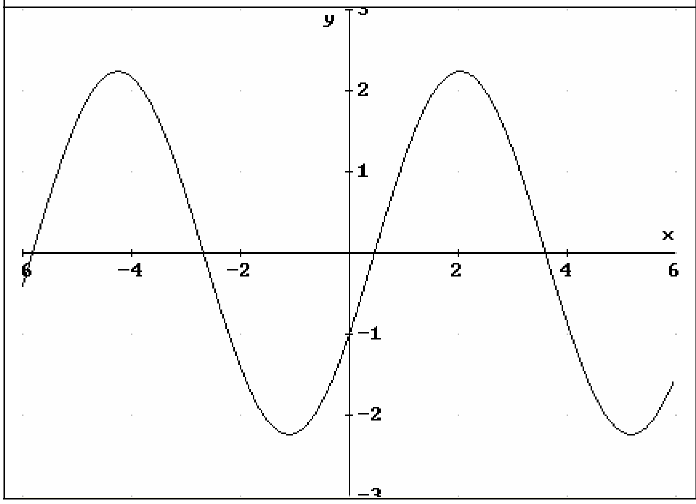
III° Passaggio : $cos\ x$



IV° Passaggio : $2 \cdot sen\ x$ *e* $cos\ x$



V° Passaggio : $f(x) = 2 \cdot sen\ x - cos\ x$



Esercizi da svolgere

Tracciare i grafici delle funzioni:

$y=(x+2)^2$; $y=(x+2)^3+1$; $y=1+sin(x+\frac{\pi}{3})$; $y=ln(x+2)$;

$y=e^{x+2}-1$; $log_{\frac{1}{a}} x$ (con $a>1$) ; $y=\sqrt{x+1}$; $y=2^{x-2}+1$;

$y=tan\left(\frac{\pi}{2}+x\right)$; $y=\frac{1}{1-x}$; $y=2\sqrt{3x}$; $y=\frac{1}{2}\sqrt{x}$;

$y=\sqrt{2x+1}$; $y=e^{|x|+1}$; $y=(x-1)^3-2$; $y=ln(x-3)+1$;

$y=e^{|x|-1}$; $y=\left|sin\,x+\frac{1}{2}\right|$; $y=\left|ln|x|+1\right|$; $y=\left|e^{|x|}-2\right|$;