

Exercises on 4.3.

1) Domains of

a) $f(x) = \sqrt{\log_3(x+1)}$

b) $g(x) = \frac{1}{\log_4(x-2)}$

2) Graph, V.A., x-int of

$$y = -\log_{1/2}(4-x) + 1$$

3) Graphs of

a) $y = \log_2|x-1|$

b) $y = |\log_3(x+2)|$

4) Find the inverse of

$$g(x) = -3 \log_2(x+2) - 1$$

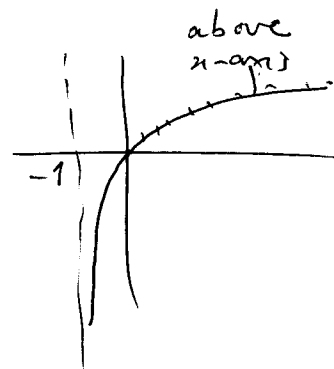
Dear Student,

Spend enough time trying to solve the exercise yourself.

If you cannot solve an exercise, look a little bit of the solution and try again.

Keep doing that until you solve it completely.

1) a) $x+1 > 0$ & $\log_3(x+1) \geq 0$
 $x > -1$ by the graph
 $x \geq 0$



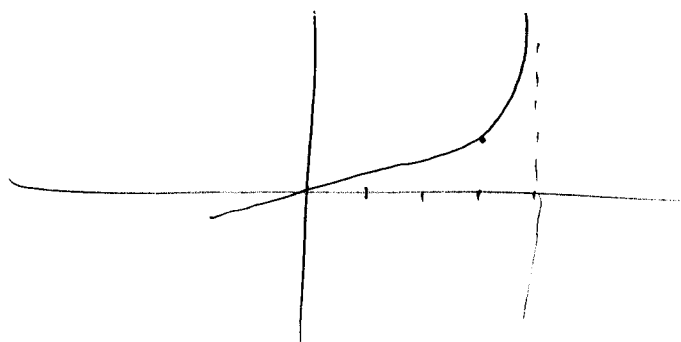
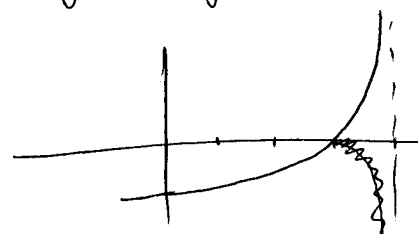
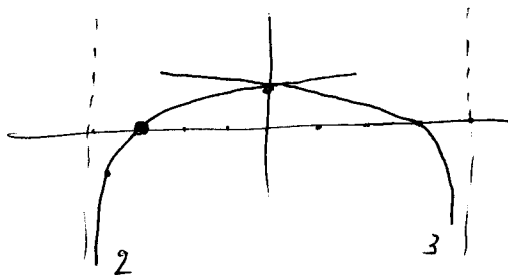
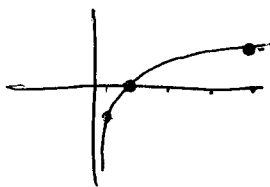
So $D = [0, \infty)$

b) $(x-2) > 0$ & $\log_4(x-2) \neq 0$
 (for $\log(x-2)$ to be defined) for the deno. to be $\neq 0$
 $x > 2$ $x-2 \neq 4^0 = 1$
 $x \neq 3$

$D = (2, 3) \cup (3, \infty)$

2) $y = -\log_{1/2}(4-x) + 1$

$y = \log_4(x) \xrightarrow{4 \text{ left}} y = \log_4(4+x) \xrightarrow{\text{Ref}/y\text{-axis}} y = \log_4(4-x)$
 $\downarrow \text{Ref}/x\text{-axis}$
 $y = -\log_4(4-x)$
 $\downarrow +1 \text{ up}$
 $y = -\log_4(4-x) + 1$



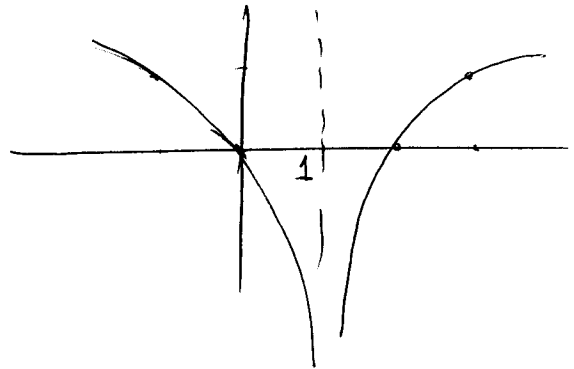
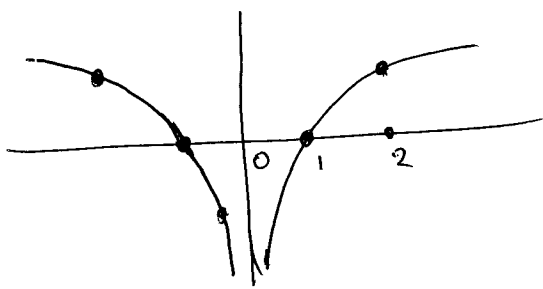
VA $x = 4$
 x -int $(0, 0)$

3) a) $y = \log_2 |x - 1|$

$y = \log_2 |x| \xrightarrow{1 \text{ to right}} y = \log_2 |x - 1|$

$y = \log_2 |x|$ is even \Rightarrow sym / y-axis

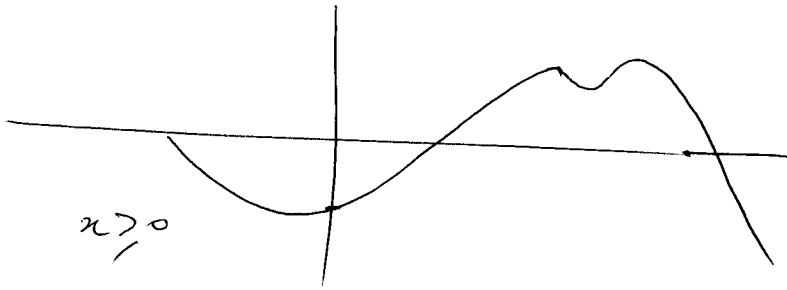
& for $x > 0$ $\log_2 |x| = \log_2 x$ so



If general

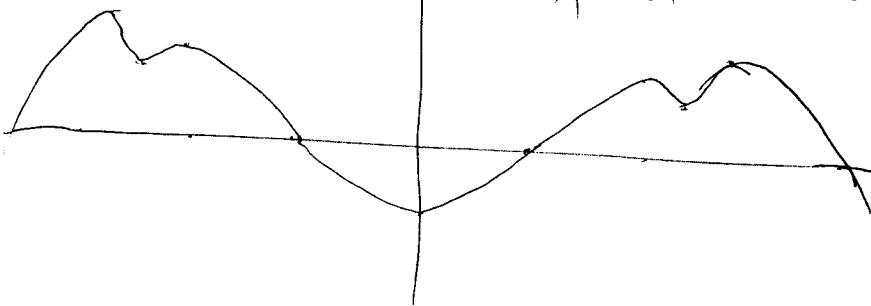
$y = f(x)$ is

Then $f(|x|) = \begin{cases} f(x) & x > 0 \\ -f(x) & x < 0 \end{cases}$



odd symmetric

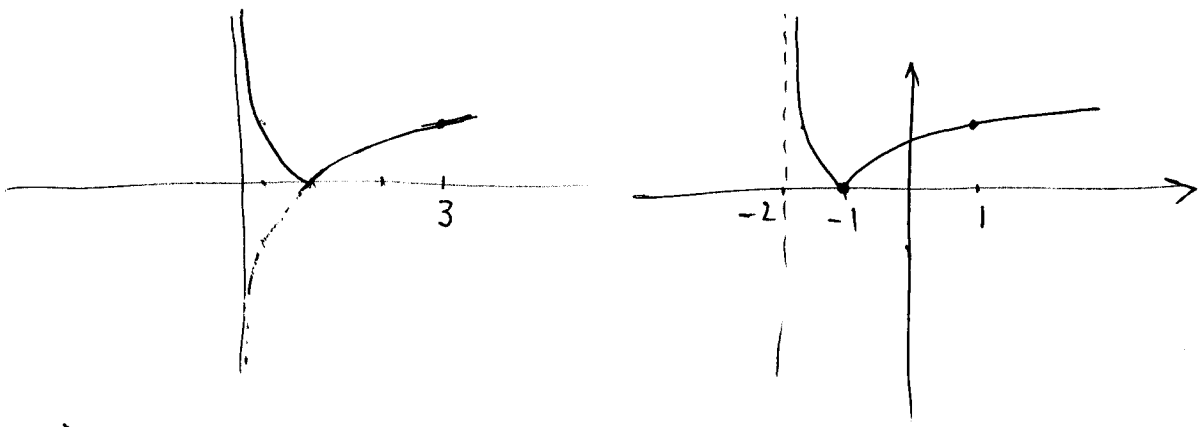
first draw on $x > 0$



3) b) $y = |\log_3(x+2)|$

$y = |\log_3 x| \xrightarrow{2 \text{ to left}} y = |\log_3(x+2)|$

Draw $y = \log_3 x$
& any part below x-axis
Reflect with respect to
the x-axis.



4) $y = -3 \log_2(x+2) - 1$
 $x = -3 \log_2(y+2) - 1$

(Interchange x & y)

$x+1 = -3 \log_2(y+2)$

$\frac{x+1}{-3} = \log_2(y+2)$

$2^{\frac{x+1}{-3}} = y+2$

$y = 2^{-\frac{x+1}{3}} - 2$

Change to exp form.

$f^{-1}(x) = 2^{-\frac{(x+1)}{3}} - 2$