Graphing Functions (Domain, Range, Even, Odd and Piecewise-Defined Functions)

Relation - a set of ordered pairs

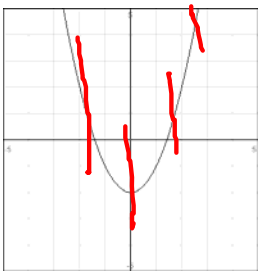
$$\{(3,-5),(5,7),(8,11),(10,11)\}$$

Function - a type of relation where each of the x coordinates are unique the relation is a function

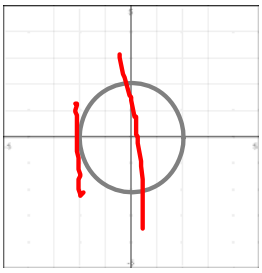
Domain - the x values $\{3,5,8,10\}$

Range - the y values $\{-5,7,11\}$

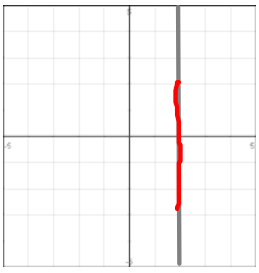
Vertical Line Test - used to determine if a graph represents a function



function



not a function



not a function

Even Function - A graph that is symmetrical with respect to the y-axis

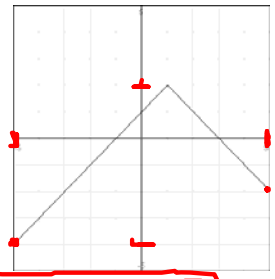
$$f(x)=f(-x)$$

Odd Function - A graph that is symmetrical with respect to the origin

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

1. Find the domain and range of each and determine if each graph represents the graph of a function.

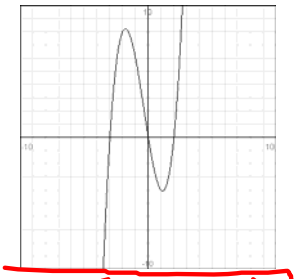
a)



D: $[-5,5]$
R: $[-4,2]$

function

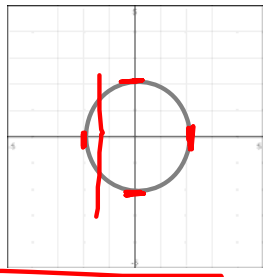
b)



D: $(-\infty,\infty)$
R: $(-\infty,\infty)$

function

c)

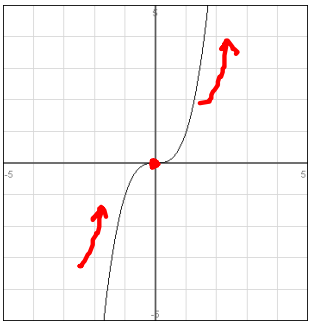


D: $[-2,2]$
R: $[-2,2]$

not a function

2. Determine the intervals for which the function is increasing, decreasing or constant. Determine whether the function is even, odd or neither. Even: $f(x)=f(-x)$ Odd: $f(x)=-f(-x)$

a)



$f(x)=x^3$

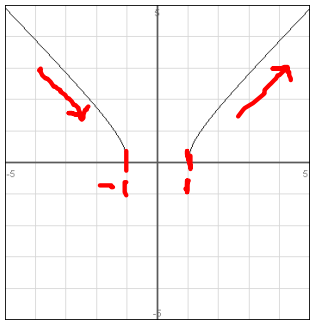
↑ $(-\infty,0)\cup(0,\infty)$

$f(-x)=(-x)^3=-x^3$

$-f(-x)=-(-x^3)=x^3$

odd

b)



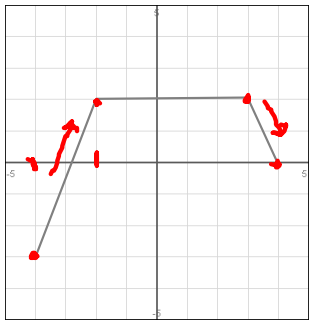
$f(x)=\sqrt{x^2-1}$

↓ $(-\infty,-1]$
↑ $[1,\infty)$

$f(-x)=\sqrt{(-x)^2-1}$
$=\sqrt{x^2-1}$

even

c)



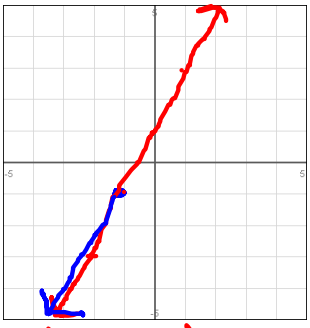
↑ $(-4,-2)$
constant $(-2,3)$
↓ $(3,4)$

neither

3. Graph each piecewise-defined function.

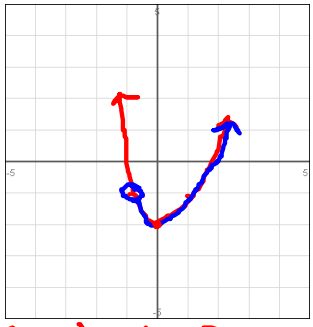
a) $f(x)=\begin{cases}2x+1, & x\le -1\\ x^2-2, & x>-1\end{cases}$

$f(x)=2x+1$
$m=2 \quad b(0,1)$

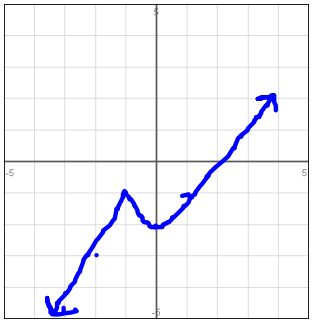


$f(-1)=2(-1)+1$
$=-2+1=-1$
$(-1,-1)$

$f(x)=x^2-2$
$V(0,-2)$

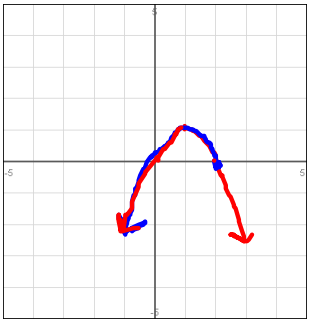


$f(-1)=(-1)^2-2$
$=1-2=-1$
$(-1,-1)$



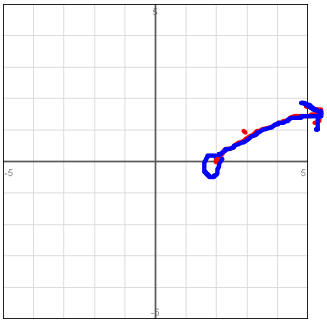
b) $f(x)=\begin{cases}1-(x-1)^2, & x\le 2\\ \sqrt{x-2}, & x>2\end{cases}$

$f(x)=-(x-1)^2+1$
$V(1,1)$



$f(2)=1-(2-1)^2$
$=1-(1)^2=0$
$(2,0)$

$f(x)=\sqrt{x-2}$
$(2,0)$



$f(2)=\sqrt{2-2}$
$=0 \quad (2,0)$