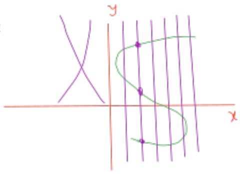
Vertical Line Test



$(-\infty,0)\cup(0,\infty)$

Find the domain and range of the function $f(x)=\frac{1}{x-2}$

∞

$R_f=\mathbb{R}-\{0\}$

$\mathbb{R}$

$\frac{1}{x-2} \rightarrow \infty$ $\quad \alpha$ ∞

$(-\infty,\infty)$

$\mathbb{R}$

$x-2=0$

$\Rightarrow x=2$

$D_f=\mathbb{R}-\{2\}$

$\frac{0}{x-2}$ $\quad (0)$??

x^2-7

$f(x)=x^2-7$

$D_f=\mathbb{R}$ $\quad R_f=[f(x)$ $\infty)$

$x^2-7 \rightarrow -ve$

if $x^2<7$

$R_f=[-7,\infty)$

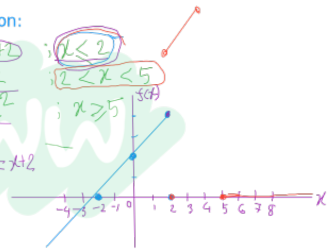
$0<x^2<7$

Piecewise defined function:

$$f(x)=\begin{cases} x+2 & ; x<2 \\ 5x & ; 2<x<5 \\ x^2 & ; x\geq 5 \end{cases}$$

$x\leq 2 \rightarrow f(x)=x+2$

$2<x<5 \rightarrow f(x)=5x$



Operations on functions:

1. $f(x)+g(x)=(f+g)(x)$
2. $f(x)-g(x)=(f-g)(x)$
3. $f(x)\,g(x)=fg\,(x)$
4. $\frac{f(x)}{g(x)}=\frac{f}{g}(x)$ $[g(x)\neq 0]$

$2+3$

$=5$

9×2

$=18$

$f(x)=1+\sqrt{x-4}$ $\qquad g(x)=x+2$

$(f+g)(x)=1+\sqrt{x-4}+x+2=3+x+\sqrt{x-4}$

$(fg)(x)=(1+\sqrt{x-4})(x+2)$

$=x+x\sqrt{x-4}+2+2\sqrt{x-4}$

Composition of functions:

$g(x)$

g

$$\begin{cases} f\circ g(x)=f(g(x)) \\ g\circ f(x)=g(f(x)) \end{cases}$$

$g(x)$ $\quad f(g(x))$

$f(x)=x+2$ $\qquad g(x)=\sqrt{x}$

$f\circ g(x)=f(g(x))=f(\sqrt{x})$ $\quad D_f=\mathbb{R}$

$=\sqrt{x}+2$ $\quad R_f=\mathbb{R}$

$\mathbb{R}$ $\quad [0,\infty)$

$g\circ f(x)=g(f(x))=g(x+2)=\sqrt{x+2}$

$D_{g\circ f}=[2,\infty)$

$x+2$

$x+2\geq 0$

$\Rightarrow x\geq -2$