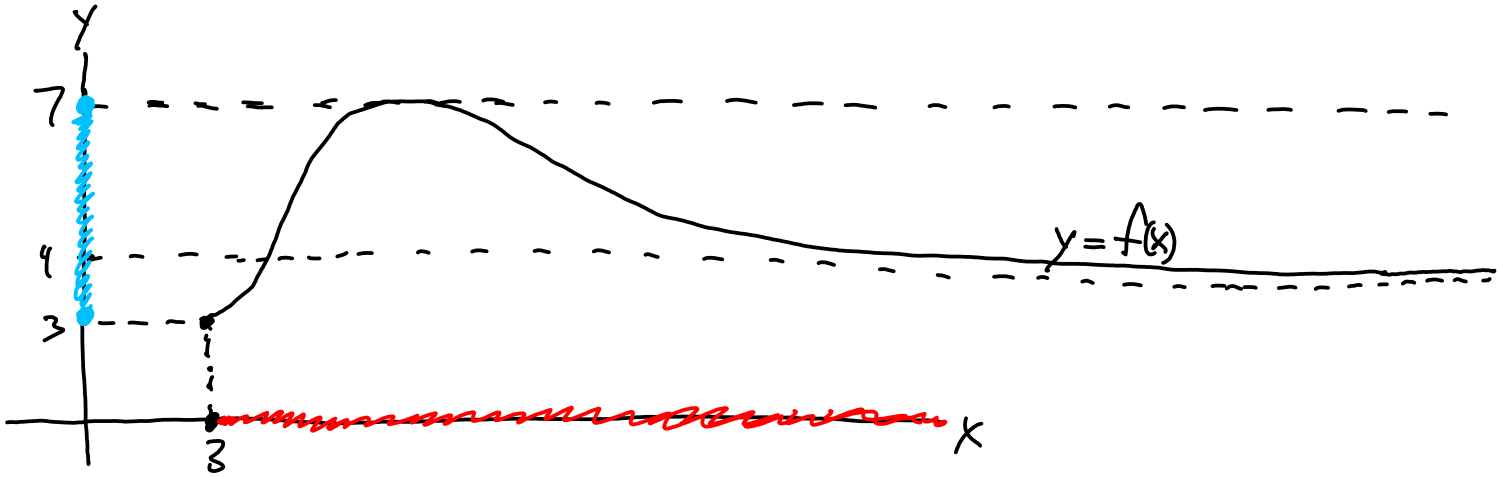
Section 2.3 Information about a function from its graph.

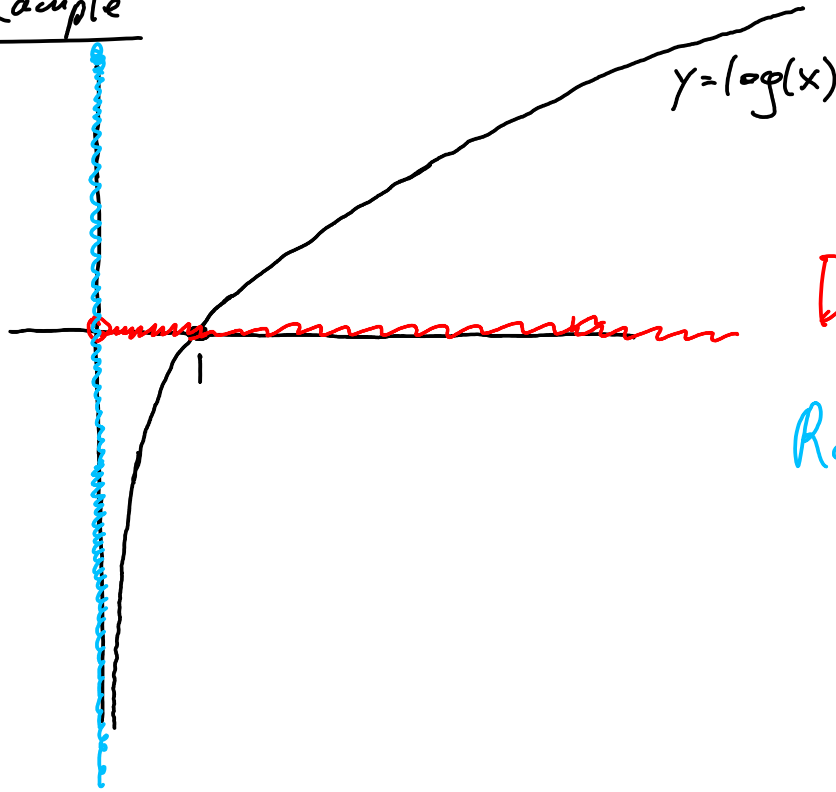


The domain of f(x) is all x-values vertically above/below the graph. In this example Domain $= [3, +\infty)$

The range of f(x) is all y-values horizontally left/righ of the graph $y=f(x)$. In this example

Range $= [3, 7]$

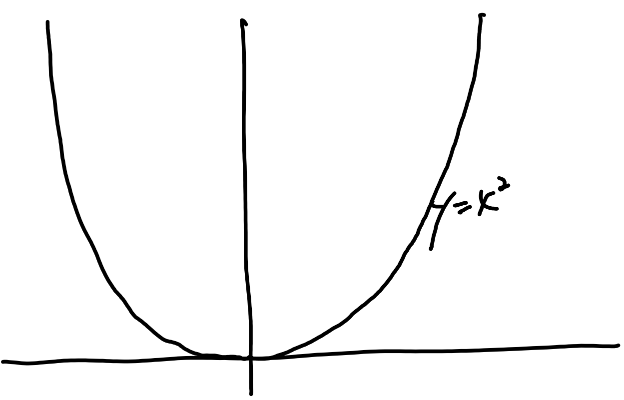
example



Domain = all $x>0$, $(0,+\infty)$

Range = all real numbers

example



Domain = all real numbers

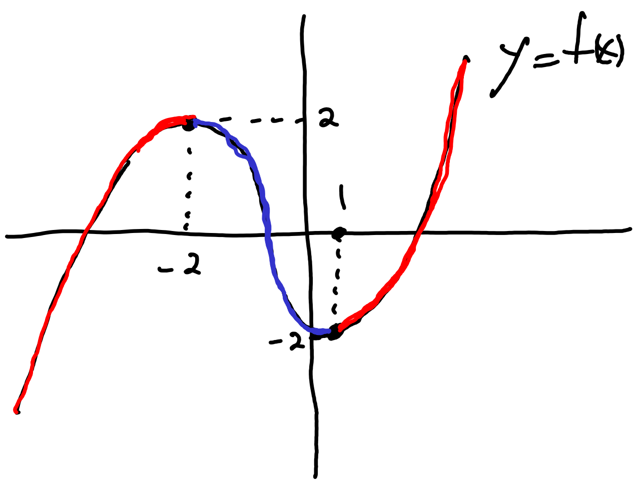
Range = $[0,+\infty)$

Intervals of increase/decrease

* The graph $y=f(x)$ is sloping upwards when $f(x)$ is <u>increasing</u> as x is increasing.

* The graph $y=f(x)$ is sloping downwards when $f(x)$ is <u>decreasing</u> as x is increasing.

<u>example</u>



This function $f(x)$

is increasing on $(-\infty,-2)\cup(1,+\infty)$

and

is decreasing on $(-2,1)$

The transition points

$(-2,2)$ is called a <u>local</u> <u>maximum</u>

$(1,-2)$ is called a <u>local</u> <u>minimum</u>

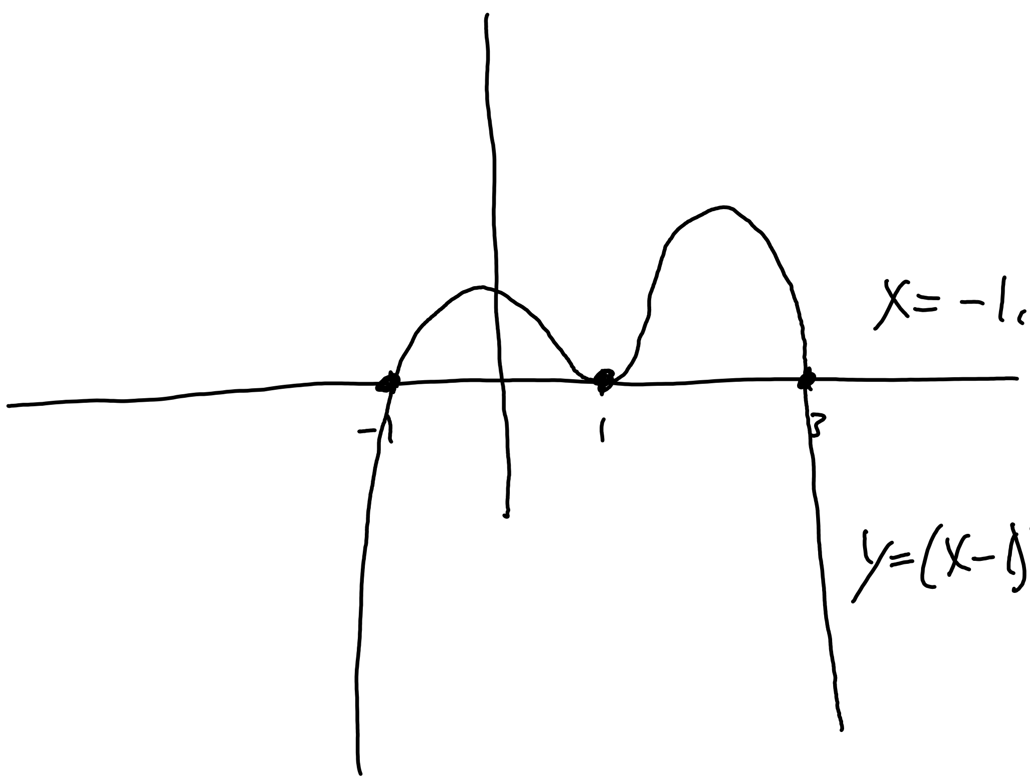
Solutions to equations shown on graphs

Given $f(x) = (x-1)^2(x+1)(x-3)$, a polynomial

The solutions to the equation $(x-1)^2(x+1)(x-3) = 0$

are the x-values where the graph $y=f(x)$

touches the x-axis.



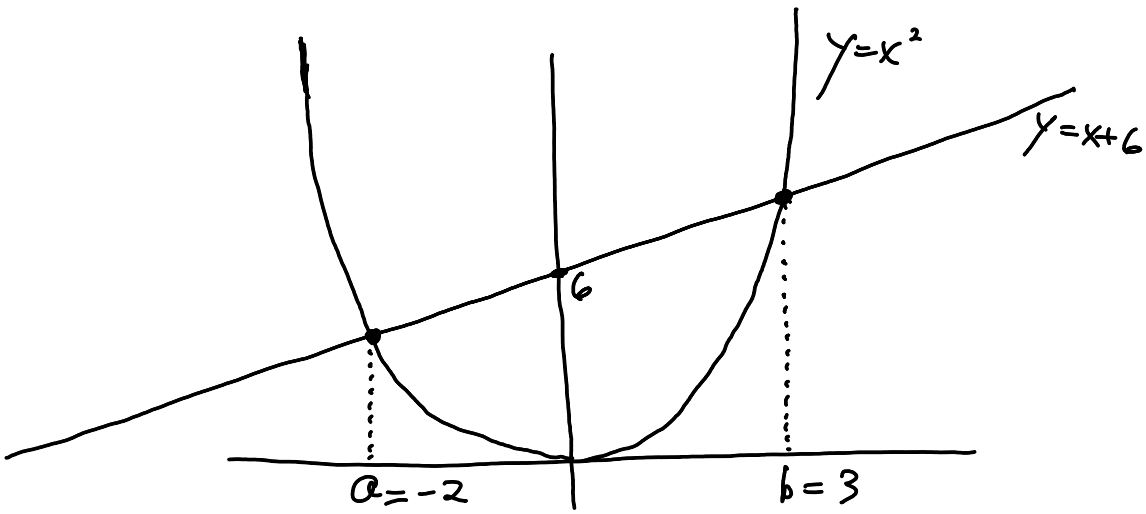
$x = -1, 1, 3$

$y=(x-1)^2(x+1)(x-3)$

Given the graphs of two functions $y=f(x)$ and $y=g(x)$,

The points at which the two graphs intersect are the solutions to the equation $f(x)=g(x)$.

example



Values a and b are the solutions to $x^2=x+6$

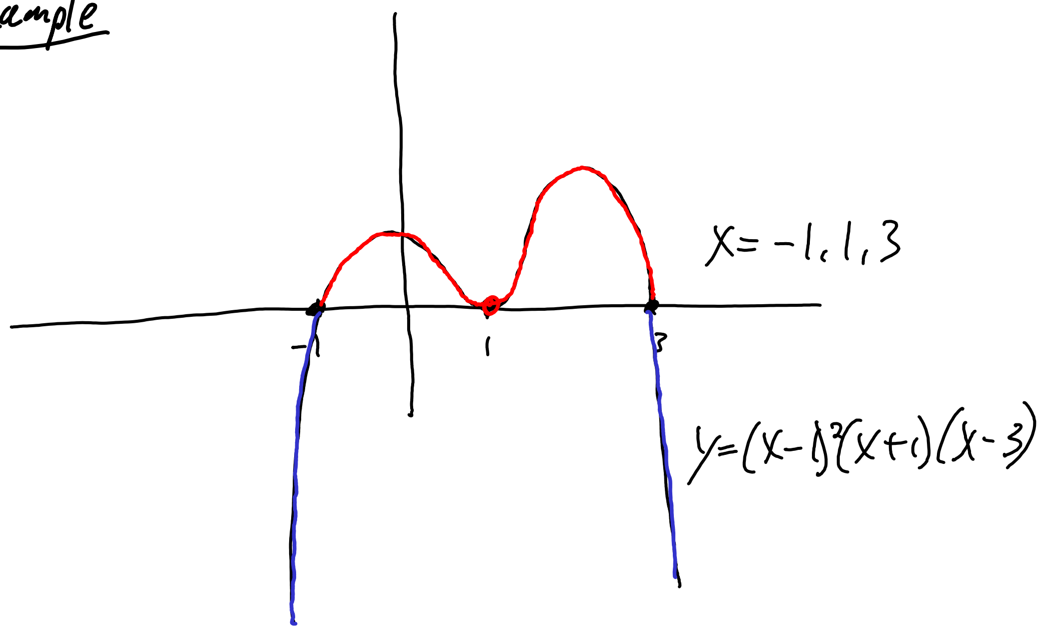
$$x^2-x-6=0$$

$$(x-3)(x+2)=0$$

$$x=-2,\ 3$$

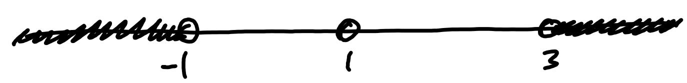
Also, solutions to inequalities can often be seen.

example

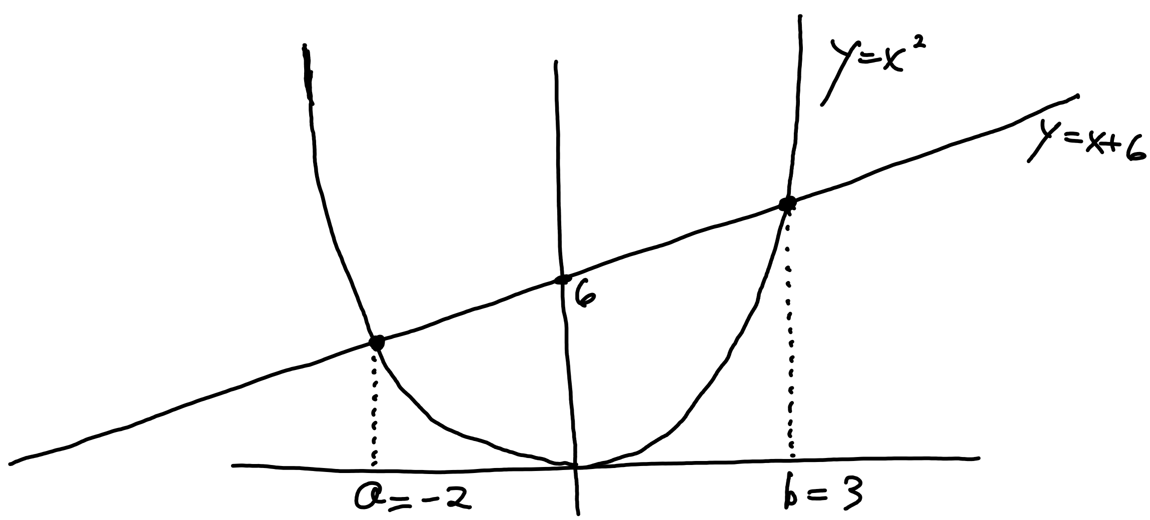


$(x-1)^2(x+1)(x-3) > 0$

$(x-1)^2(x+1)(x-3) < 0$



example



$x^2 < x+6$

$x^2 > x+6$