2A.1. x- and y-intercepts

Definitions

(1) x-intercept ≡ where a graph touches the x-axis.

(2) y-intercept ≡ where a graph touches the y-axis.

(3) domain ≡ the x-values which may be put into a function.

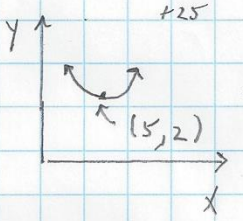
(4) range ≡ the y-values exhibited by a function.

Example #1. For (1) $y = x^2 - 10x + 27$ and (2) $y = x^2 - 2x - 3$, find
(a) the x- and y-intercepts
(b) state the domain and range.

SOLUTION:

(1) $y - 27 = x^2 - 10x$, $y - 2 = x^2 - 10x + 25$, $y - 2 = (x-5)^2$

(+25) (+25)



y-intercept ($x=0$): $y = 27$ ◄

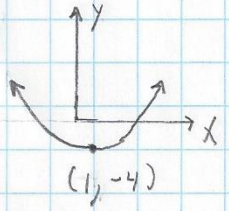
$\Rightarrow$ no x-intercepts ◄

domain: $-\infty < x < \infty$ ◄ (all x)

range: $2 \le y < \infty$ ◄

(2) $y + 3 = x^2 - 2x$, $y + 4 = x^2 - 2x + 1$, $y + 4 = (x-1)^2$

(+1) (+1)



x-intercepts ($y=0$): $0 = x^2 - 2x - 3 = (x-3)(x+1) \Rightarrow x = -1$ ◄ $x = 3$ ◄

y-intercepts ($x=0$): $y = -3$ ◄

domain: $-\infty < x < \infty$ ◄ range: $-4 \le y < \infty$ ◄

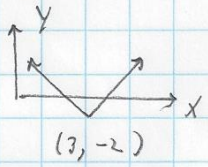
Example #2. For (1) $y+2=|x-3|$ and (2) $y-2=|x+3|$ find

(a) the x- and y-intercepts

(b) state the domain and range

SOLUTION:

(1)



x-intercepts: $x \le 3$: $y+2=-(x-3)$, $y+2=-x+3$

$y=-x+1$, $y=0 \Rightarrow 0=-x+1$, $x=1$ ◄

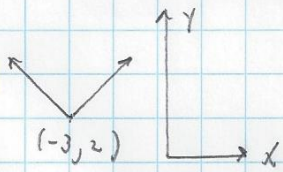
$x>3$: $y+2=x-3$, $y=x-5$

$y=0 \Rightarrow x=5$ ◄

y-intercepts: $y=-x+1$, $x=0 \Rightarrow y=1$ ◄

domain: $-\infty < x < \infty$ ◄ range: $-2 \le y < \infty$ ◄

(2)



no x-intercepts ◄

y-intercepts: $x>-3$, $y-2=x+3$, $y=x+5$,

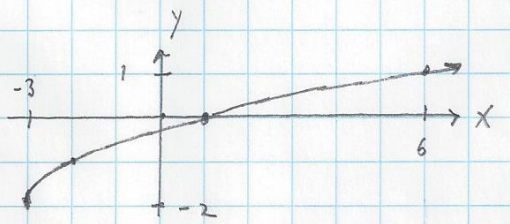
$x=0 \Rightarrow y=5$ ◄

domain: $-\infty < x < \infty$ ◄ range: $2 \le y < \infty$ ◄

Example #3. Graph $y=\sqrt{x+3}-2$. State the domain and range.

SOLUTION:

x	y
-3	-2
-2	-1
1	0
6	1



domain: $-3 \le x < \infty$ ◄

range: $-2 \le y < \infty$ ◄