Graphing Piecewise Defined Functions and Finding Domain and Range

$$f(x) = \begin{cases} x+1, & -3 \le x < 0 \\ x^2, & 0 \le x \le 2 \end{cases}$$

① Plug in intervals for each equation

$f(x) = x + 1$

$y = x + 1$

$y = (-3) + 1 = -2 \rightarrow$ new point $(-3, -2)$

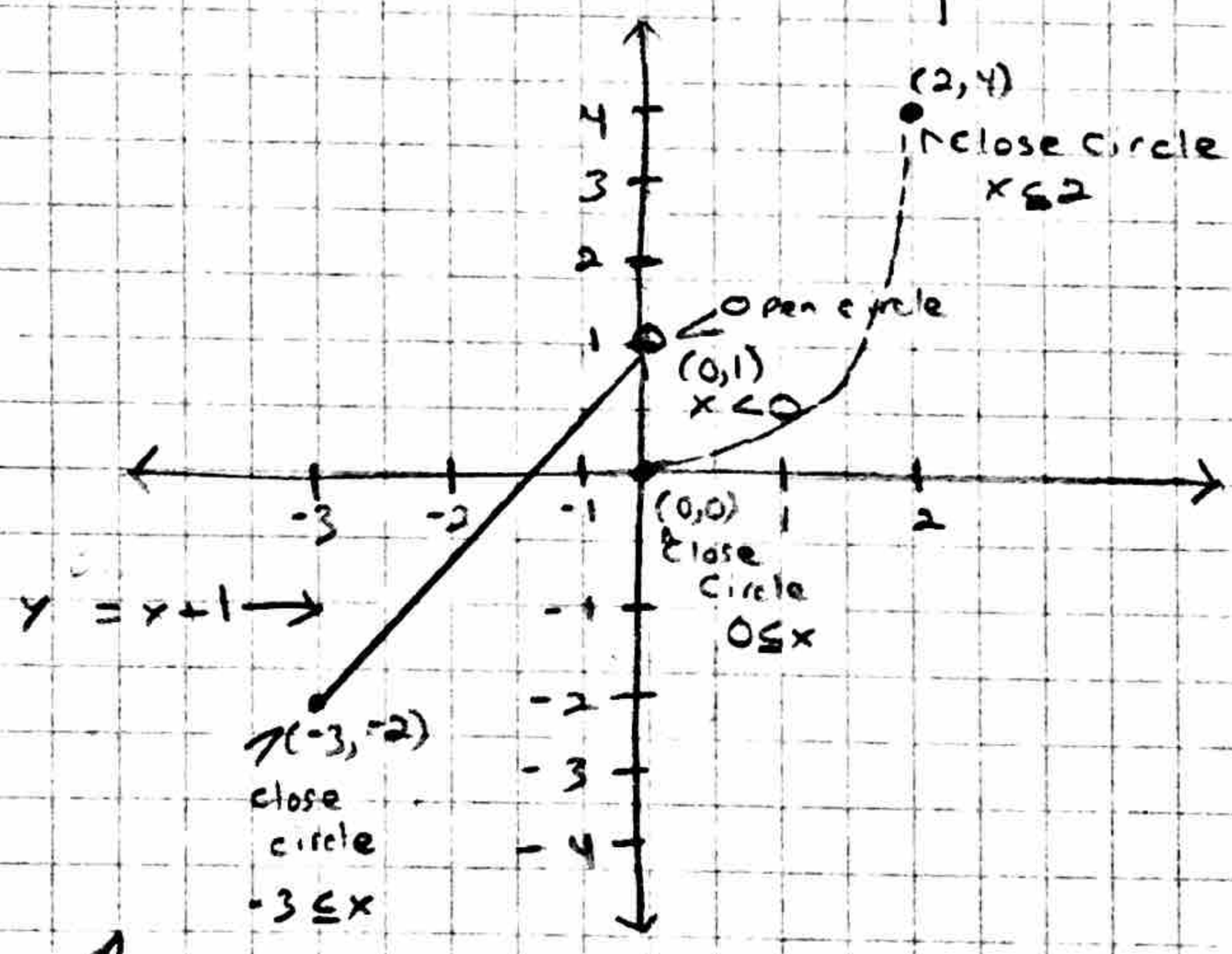
$y = (0) + 1 = 1 \rightarrow$ new point $(0, 1)$

$f(x) = x^2$

$y = x^2$

$y = (0)^2 = 0 \rightarrow$ new point $(0, 0)$

$y = (2)^2 = 4 \rightarrow$ new point $(2, 4)$



For $f(x) = x^2$, Im only graphing the interval $0 \le x \le 2$.

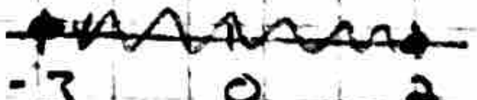
For $f(x) = x + 1$, Im only graphing the interval $-3 \le x < 0$.

Domain and Range

$$f(x) = \begin{cases} x+1, & -3 \le x < 0 \\ x^2, & 0 \le x \le 2 \end{cases}$$

$-3 \le x < 0 \rightarrow$ Lowest x coord is -3

$0 \le x \le 2 \rightarrow$ Highest x coord is 2



D: $[-3, 2]$

Check Range on Graph

Range: $[-2, 4]$ Start from lowest y coord to highest y coord.

$$f(x) = \begin{cases} x, & -3 \le x \le 0 \\ 2, & 0 < x < 1 \\ \sqrt{x}, & 1 \le x < 4 \end{cases}$$

$f(x) = x$

$y = x$

$y = (-3) = -3, (-3, -3)$

$y = (0) = 0, (0, 0)$

$f(x) = 2$

$y = 2$

$y = 0$ at x coordinate 0

$y = 1$ at x cordinate 1

$f(x) = \sqrt{x}$

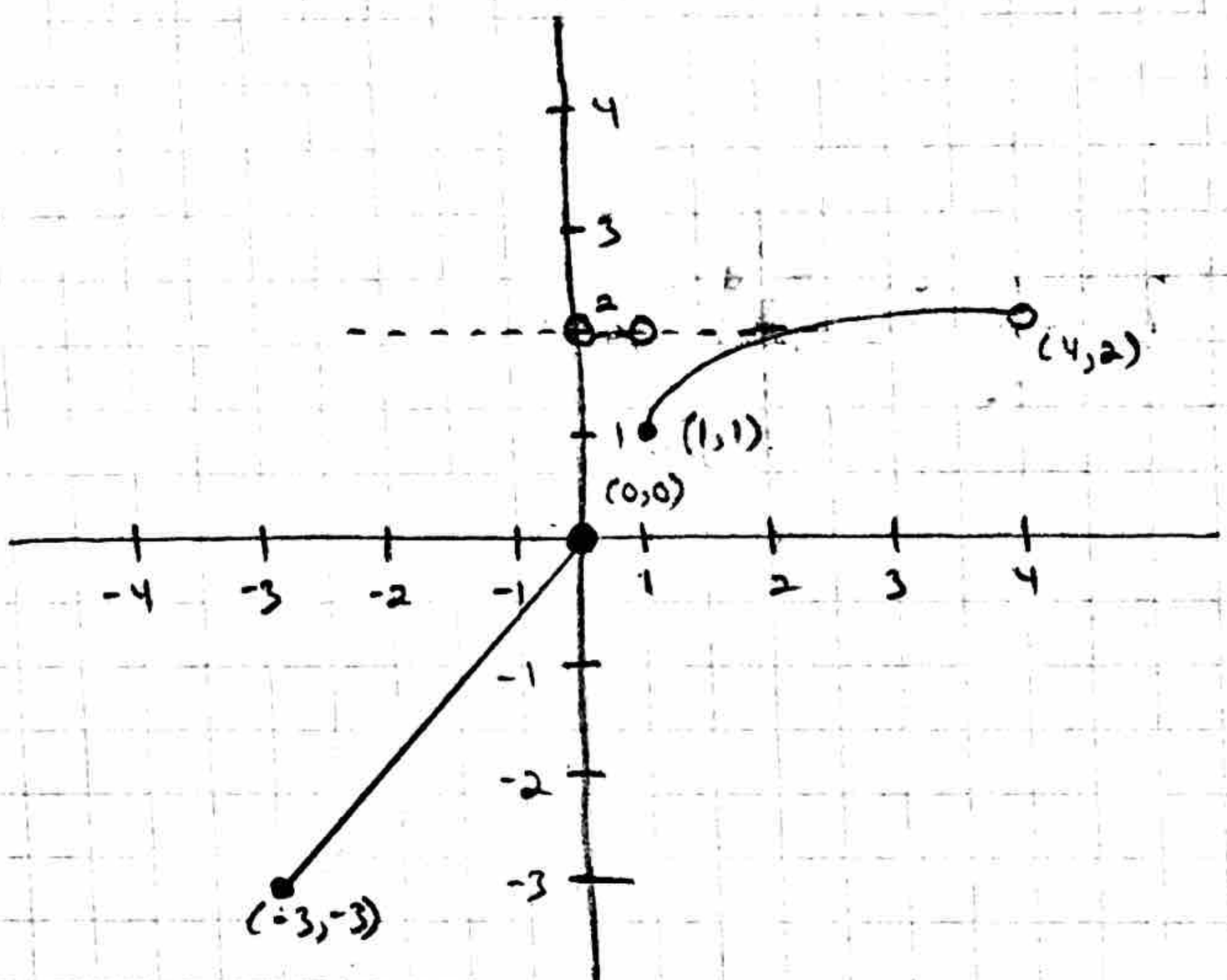
$y = \sqrt{x}$

$y = \sqrt{(1)} = 1, (1, \sqrt{1})$

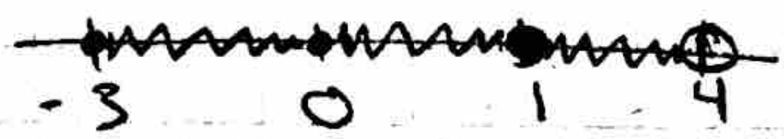
$(1, 1)$

$y = \sqrt{(4)} = 2, (4, \sqrt{4})$

$(4, 2)$



Domain and Range



$D: [-3, 4)$

$R: [-3, 0] \cup [1, 2]$

Need to include bracket for $y = 2$. 2 is desired for $f(x) = 2$

$$f(x) = \begin{cases} x, & -3 \le x \le 0 \\ 2, & 0 < x < 1 \\ \sqrt{x}, & 1 \le x < 4 \end{cases}$$

$1 \le$ ↑ you shade this in on numberline since its $\le$

$$f(x) = \begin{cases} -2, & x \le -3 \\ 4-x, & -3 < x < 0 \\ x, & x \ge 0 \end{cases}$$

← This is only for x values that are ≤ -3

$f(x) = -2$

$y = -2$

for

x values that are ≤ -3

$f(x) = 4 - x \quad y = mx + b$

$y = 4 - x \rightarrow y = -x + 4$

$y = 4 - (-3) = 7, (-3, 7)$

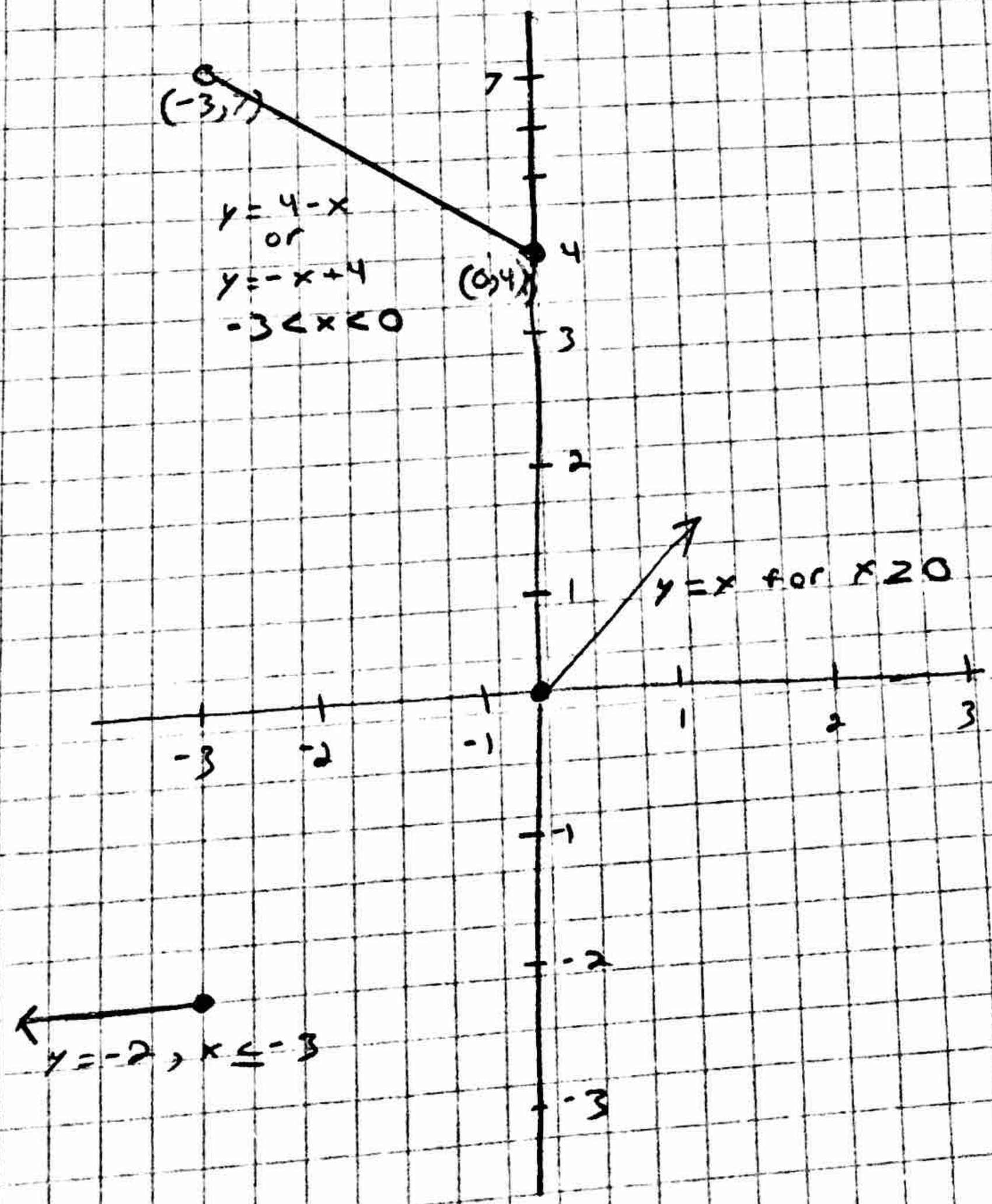
$y = 4 - (0) = 4, (0, 4)$

$f(x) = x$

$y = x$

$y = 0$

$y = x$ for x values ≥ 0



$$f(x) = \begin{cases} x^2, & -3 \le x \le 1 \\ 1+x^2, & 1 < x < 3 \end{cases}$$

D: $[-3, 1]$
$\cup$
D: $(1, 3)$
D: $[-3, 3)$

R: $[0, 9]$
$\cup$
R: $(2, 10)$
R: $[0, 10)$

$f(x) = x^2$
$y = x^2$
$y = (-3)^2 = -3 \cdot -3 = 9, (-3, 9)$
$y = (1)^2 = 1, (1, 1)$

$f(x) = 1 + x^2$
$y = 1 + x^2$
$y = 1 + (1)^2$
$1 + 1 = 2, (1, 2)$

$y = 1 + (3)^2 = 1 + 3 \cdot 3$
$= 1 + 9$
$= 10, (3, 10)$